No	Tanggal	Keterangan
1	21 Desember 2023	Penulis korespondensi mengirimkan **naskah publikasi** ke organizing committee.
2	25 Desember 2023	Redaksi memberikan naskah, dan meminta penulis melengkapi form Authors Information.
		Penulis mengirimkan form Authors Information.
3	16 Januari 2024	Redaksi memberikan informasi naskah lolos preliminary review.
4	25 Januari 2024	Naskah dalam proses review.
5	4 Februari 2024	Naskah dinyatakan **Diterima dengan Revisi**.
6	26 Februari 2024	Penulis bertanya proses pembayaran dan revisi.
	26 Februari 2024	Conference Committee menjelaskan proses pembayaran dan revisi.
7	28 Februari 2024	Penulis menyatakan akan presentasi secara daring.
8	29 Februari 2024	Conference Committee menjelaskan proses pembayaran.
9	1 Maret 2024	Penulis menyelesaikan kewajiban pembayaran dan mengirimkan revisi naskah.
10	3 Maret 2024	Conference Committee mengirimkan bukti pembayaran.
11	15 Maret 2024	Conference Committee mengirimkan informasi conference program. Conference Committee mengundang penulis untuk menjadi Session Chair of Session 7.
		Penulis konfirmasi kesiapan presentasi pada Session 7.
12	19 Maret 2024	Conference Committee mengirimkan reminder terkait conference program.
13	26 Maret 2024	Penulis menanyakan proses kelanjutan publikasi dalam bentuk Proceeding Book.
14	27 Maret 2024	Conference Committee memberikan informasi proses kelanjutan Proceeding Book
15	28 April 2024	Conference Committee memberikan informasi Revisi untuk Naskah.
16	29 April 2024	Penulis mengirimkan revisi perbaikan naskah
17	28 Juli 2024	Redaksi Lecturer Notes In Civil Engineering memberitahukan bahwa proses final proof telah selesai dilakukan oleh penulis dan editor.
18	16 September 2024	Conference Committee mengirimkan informasi kepada penulis untuk memeriksa final proof naskah.
19	1 Oktober 2024	Naskah sudah **terbit** pada **Lecturer Notes in Civil Engineering**, prosiding terindeks SCOPUS.

34 of 34

ICOCE 2024: Your Submission to ICOCE 2024 has been Received!

Inbox ×

Iconf.org <send@m.aconference.org> Thu, Dec 21, 2023, 11:20 AM

to me

Dear Sir/Madam,

Thank you for your support to ICOCE 2024 !

Your submission has been received by the system.The conference specialist will check the submission and send you feedback within 3 working days. Please check your email later. If you have any question, please contact the conference specialist for help.

Best wishes

iConf Conference Management System

This is an auto message from iConf conference system, please do not reply.

Reply Forward

Submission Confirmation--XJ0041

Inbox ×

ICOCE <icoce@etpub.com> Mon, Dec 25, 2023, 10:10 PM

to me, novi, deni.setiawan, vivi.arisandhy, hendry.w, 2021002

Dear Yosafat Aji Pranata, Novi, Deni Setiawan, Vivi Arisandhy, Hendry Wong, Sof-hie Angela Hagiyanto,

Thank you for your interests to our conference ICOCE 2024. Your submission has been received. The paper title is Shear Strength of Red Meranti (Shorea spp.) Timber at An Angle to The Grain and given Paper ID is XJ0041.

Your paper will enter the review process of the conference committee and you'll be informed of the final review result around January 25th, 2024. Please fill in the attached author information form and send it back to me in three days.

Have a nice day!

Thanks & Regards,

Ms. Iris Tang

ICOCE 2024 Conference Secretary

Email: icoce@etpub.com | **Tel.:** +86-18117808141

ICOCE Website: http://www.icoce.org/

paper status--XJ0041

Inbox ×

ICOCE <icoce@etpub.com> Tue, Jan 16, 2024, 3:25 PM

to me, novi, deni.setiawan, vivi.arisandhy, hendry.w, 2021002

Dear Yosafat Aji Pranata, Novi, Deni Setiawan, Vivi Arisandhy, Hendry Wong, Sof-hie Angela Hagiyanto,

I'm writing to inform you that your paper has passed the preliminary review and will enter the further round review. Please wait for my notification around January 25th, 2024.

Thanks & Regards,

Ms. Iris Tang

ICOCE 2024 Conference Secretary

Email: icoce@etpub.com | **Tel.:** +86-18117808141

ICOCE Website: http://www.icoce.org/

paper status--XJ0041

Inbox ×

ICOCE <icoce@etpub.com> Thu, Jan 25, 2024, 9:47 PM

to me, novi, deni.setiawan, vivi.arisandhy, hendry.w, 2021002

Dear Yosafat Aji Pranata, Novi, Deni Setiawan, Vivi Arisandhy, Hendry Wong, Sof-hie Angela Hagiyanto,

Your paper XJ0041 is still in the process of review and it will take another several days. Please wait for my notification around February 5.

Thanks & Regards,

Ms. Iris Tang

ICOCE 2024 Conference Secretary

Email: icoce@etpub.com | **Tel.:** +86-18117808141

ICOCE Website: http://www.icoce.org/

Notification of ICOCE2024--XJ0041

Inbox ×

ICOCE <icoce@etpub.com> Sun, Feb 4, 2024, 10:12 PM

to me, novi, deni.setiawan, vivi.arisandhy, hendry.w, 2021002

Dear Yosafat Aji Pranata, Novi, Deni Setiawan, Vivi Arisandhy, Hendry Wong, Sof-hie Angela Hagiyanto,

Congratulations!Thanks very much for your concern. ICOCE 2024 reviewing procedure of your paper has finished.

We are glad to tell you that your paper (Paper ID: XJ0041) entitled in “Shear Strength of Red Meranti (Shorea spp.) Timber at An Angle to The Grain” is accepted for presentation with publication by the conference committee.

Attachment is the Notification of Acceptance. Please finish the registration as soon as possible. (Registration deadline: February 25, 2024)

We are waiting for your attendance! If you have any question, please don’t hesitate to contact me.

Thanks & Regards,

Ms. Iris Tang

ICOCE 2024 Conference Secretary

Email: icoce@etpub.com | **Tel.:** +86-18117808141

ICOCE Website: http://www.icoce.org/

yosafat ap <yosafat.ap@gmail.com> Mon, Feb 26, 2024, 6:05 AM

to ICOCE

ear ICOCE 2024 Organizing Committee

Let me know how to complete Registration and Payment for my papers (Paper ID: XJ0042 and XJ0041).

Thank you.

Authors of Paper ID: XJ0042 and XJ0041.

•••

ICOCE <icoce@etpub.com>
to me

Feb 26, 2024, 10:45 AM

Dear Yosafat Aji Pranata,

Please finish the registration and payment through http://confsys.iconf.org/register/icoce2024.

You will present for the 2 papers?Do you plan to attend ICOCE 2024 virtually or physically?

Thanks & Regards,
Ms. Iris Tang
ICOCE 2024 Conference Secretary
Email: icoce@etpub.com | **Tel.:** +86-18117808141
ICOCE Website: http://www.icoce.org/

发件人：yosafat ap <yosafat.ap@gmail.com>
发送日期：2024-02-26 07:05:44
收件人：ICOCE <icoce@etpub.com>
主题：Re: Notification of ICOCE2024--XJ0041

yosafat ap <yosafat.ap@gmail.com>
to ICOCE

Feb 28, 2024, 11:00 AM

Dear ICOCE committee

Thank you for your information, i will complete the registration as soon as possible.
Is it mean that i must register for 2 (two) papers sir?

Let me present for the 2 papers virtually (online), Sir/Madam.
Thank you.

Regards,
Yosafat
First and Corresponding Author Paper ID: XJ0042 and XJ0041

•••

ICOCE <icoce@etpub.com>
to me

Feb 29, 2024, 2:14 PM

Dear Yosafat,

Yes,you need to register for 2 papers if you want to publish 2 papers.

Thanks & Regards,
Ms. Iris Tang
ICOCE 2024 Conference Secretary
Email: icoce@etpub.com | **Tel.:** +86-18117808141
ICOCE Website: http://www.icoce.org/

发件人：yosafat ap <yosafat.ap@gmail.com>
发送日期：2024-02-28 12:00:08
收件人：ICOCE <icoce@etpub.com>
主题：Re: Re: Notification of ICOCE2024--XJ0041

•••

yosafat ap <yosafat.ap@gmail.com> Mar 1, 2024, 8:45 AM

to ICOCE

Dear ICOCE committee

Thank you for your information, i will complete the registration for Paper ID XJ0042 (560 USD) and XJ0041 (560 USD) today.
Let me present for the 2 papers virtually (online) and publish on Springer book series: Lecture Notes in Civil Engineering.
Thank you.

Regards,
Yosafat
First and Corresponding Author Paper ID: XJ0042 and XJ0041

yosafat ap <yosafat.ap@gmail.com> Mar 1, 2024, 11:19 AM

to ICOCE

Dear ICOCE 2024 Committee

I finished registration and submit final papers (Paper ID XJ0042 and Paper ID XJ0041), and pay for USD 1120 (Authors, publication on Springer book series: Lecture Notes in Civil Engineering).
Let me to present my papers Virtually (Online Presentation) according to my request in a Confsys system.

Can you send me an electronic official receipt for my payment (2 Papers USD 1120), Sir/Madam?

Thank you.

Regards,
Yosafat Aji Pranata
First and Corresponding Author Paper ID: XJ0042 and XJ0041

Account Overview | My Submission | My Registration

Have made the submission in other ways and need to register alone? New register

Total:2

Registration information needs to be submitted

Conference	Title	Action

Registered information that has been submitted

Conference	Total	Paper ID	Payment	Final Paper
ICOCE 2024	560.00 USD / 4010.00 CNY	XJ0042	completed	completed Update
ICOCE 2024	560.00 USD / 4010.00 CNY	XJ0041	completed	completed Update

ICOCE 2024	42	Flexural Behavior of Indonesian Berua Timber: Experimental Test and Numerical Analysis	Full Paper (Presentation and Publication)	Accept	Update Withdraw
ICOCE 2024	41	Shear Strength of Red Meranti (Shorea spp.) Timber at An Angle to The Grain	Full Paper (Presentation and Publication)	Accept	Update Withdraw

Re:Re: Re: Re: successful regsitration--XJ0041&XJ0042

Inbox ×

ICOCE <icoce@etpub.com>
to me

Sun, Mar 3, 2024, 6:13 PM

Dear Yosafat Aji Pranata,

The registration for XJ0041 and XJ0042 are successful. Please find the attached receipts for you.

The detailed conference program will be finished and send to you in the middle of March, 2024.

Thanks & Regards,
Ms. Iris Tang
ICOCE 2024 Conference Secretary
Email: icoce@etpub.com | **Tel.:** +86-18117808141
ICOCE Website: http://www.icoce.org/

Urgent-- Sincere session chair invitation from ICOCE 2024

Inbox ×

ICOCE <icoce@etpub.com>
to me

Fri, Mar 15, 2024, 3:21 PM

Dear Assoc. Prof. Yosafat Aji Pranata,

Warm greetings from ICOCE 2024.Thank you for your great support to ICOCE 2024.

We are now preparing the detailed conference program.Your 2 online oral presentations XJ0041&XJ0042 will be in session 7 on March 24, 2024. Session 7 will be 10:00--12:00(GMT+8) on March 24, 2024.
We sincerely invite you to be the session chair of session 7.The topic of session 7 is Engineering Vibration and Mechanical Properties of Building Structures. May I know is it available for you to be the session chair of session 7? Hope to receive your early and positive reply.

Thanks & Regards,
Ms. Iris Tang
ICOCE 2024 Conference Secretary
Email: icoce@etpub.com | **Tel.:** +86-18117808141
ICOCE Website: http://www.icoce.org/

yosafat ap <yosafat.ap@gmail.com>
to ICOCE

Fri, Mar 15, 2024, 3:27 PM

Dear ICOCE 2024 Organizing Committee

Thank you for the information about online oral presentations. I will presents Papers ID XJ0041 and XJ0042 in Session 7, on March 24, 10:00-12:00 GMT+8.
Let me know if the detailed conference program will be released, soon.

Thank you Sir/Madam.

Regards,
Yosafat Aji Pranata
Presenter of Papers ID XJ0041 and XJ0042

•••

Re:Re: conference program-- ICOCE 2024

Inbox ×

ICOCE <icoce@etpub.com>
to me

Sat, Mar 16, 2024, 10:34 PM

Dear Yosafat Aji Pranata,

Thank you all the same. Please find the attached conference program for you.

Thanks & Regards,
Ms. Iris Tang
ICOCE 2024 Conference Secretary
Email: icoce@etpub.com | **Tel.:** +86-18117808141
ICOCE Website: http://www.icoce.org/

ICOCE2024 Conference program

Inbox ×

ICOCE <icoce@etpub.com>
to me

Tue, Mar 19, 2024, 10:24 PM

Dear ICOCE 2024 online participants,

Warm greetings!There are some changes about online test time and online sessions time.Please find the attached detailed conference program. You can search your paper ID and find your session. Each presenter has 15 minutes in total, including 12 minutes' presentation and 3 minutes' Q&A.

We'll have an online test on March 22 and March 24 will be for online presentations.

Please join the online test on time on March 22(14:00-16:00 GMT+8) through the link https://us02web.zoom.us/j/89086968540.Room ID: 890 8696 8540
Online session 7 will be 13:30-16:15(GMT+8) on March 24. Online session 8 will be 16:30-18:30(GMT+8) on March 24,2024.

Please join the session 15-20 minutes in advance on March 24, 2024 through the link https://us02web.zoom.us/j/89086968540.Room ID: 890 8696 8540

We are looking forward to your participation.

Thanks & Regards,
Ms. Iris Tang
ICOCE 2024 Conference Secretary
Email: icoce@etpub.com | **Tel.:** +86-18117808141
ICOCE Website: http://www.icoce.org/

yosafat ap <yosafat.ap@gmail.com> Tue, Mar 26, 2024, 7:24 AM

to ICOCE

Dear ICOCE 2024 Organizing Committee

Thank you for the conference and online session during March 22-24. Let me know when the proceeding book (Lecturer Notes in Civil Engineering, Springer) will be release?

Regards,
Yosafat A.P.
Paper ID XJ0041 and XJ0042

•••

ICOCE <icoce@etpub.com> Wed, Mar 27, 2024, 10:20 AM

to me

Dear Yosafat A.P.,

Usually the accepted papers will be published 3-6 months after the conference. Please keep in touch in case the paper need to e modified.

Thanks & Regards,
Ms. Iris Tang
ICOCE 2024 Conference Secretary
Email: icoce@etpub.com | **Tel.:** +86-18117808141
ICOCE Website: http://www.icoce.org/

yosafat ap <yosafat.ap@gmail.com> Mon, Apr 15, 2024, 9:54 AM

to ICOCE

Dear ICOCE 2024 Committee

Thank you for your information.

Regards,
Author Paper ID XJ0041 and XJ0042

•••

Reply Forward

about paper publication--XJ0041

Inbox ×

ICOCE <icoce@etpub.com>
to me, novi, deni.setiawan, vivi.arisandhy, hendry.w, 2021002

Sun, Apr 28, 2024, 5:02 AM

Dear Yosafat Aji Pranata, Novi, Deni Setiawan, Vivi Arisandhy, Hendry Wong, Sof-hie Angela Hagiyanto,

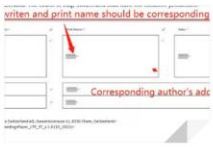
I received the notification from publishing house that your paper need to be revised based on the attached version according to the following tips.

1. [14] is not mentioned in the paper, please kindly mention it.
2.reference should be mentioned in sequence. However, [10] is mentioned ahead of [8],[9], please kindly revise accordingly.

In addition, **you need to fill in the copyright form and send it together with the modified paper to me in 2 days.**

Thanks & Regards,
Ms. Iris Tang
ICOCE 2024 Conference Secretary
Email: icoce@etpub.com | **Tel.:** +86-18117808141
ICOCE Website: http://www.icoce.org/

4 Attachments • Scanned by Gmail


Springer_Proceed...

final paper--XJ0...

yosafat ap <yosafat.ap@gmail.com>
to ICOCE

Mon, Apr 29, 2024, 9:01 AM

Dear ICOCE 2024 Conference Secretary

Attached is final paper of XJ0041 and has been revised according the notification of publishing house. Also attached the License to Publish (Signed by corresponding author). Thank you Ms.

Regards,
Yosafat Aji Pranata

2 Attachments • Scanned by Gmail


final paper--XJ0...

XJ0041_Springer...

Reply Forward

11 of 25

yosafat ap <yosafat.ap@gmail.com>
to ICOCE
Tue, Jul 16, 2024, 8:23 AM

y

yosafat ap <yosafat.ap@gmail.com>
to ICOCE
Tue, Mar 26, 7:24 AM

Dear ICOCE 2024 Organizing Committee

Thank you for the conference and online session during March 22-24. Let me know when the proceeding book (Lecturer Notes in Civil Engineering, Springer) will be release?

Regards,
Yosafat A.P.
Paper ID XJ0041 and XJ0042

ICOCE <icoce@etpub.com>
to me
Tue, Jul 16, 2024, 10:53 PM

Dear Yosafat A.P. ,
The papers of ICOCE 2024 are still in the process of publication. Please wait for the notification from publishing house.

Thanks & Regards,
Ms. Iris Tang
ICOCE 2024 Conference Secretary
Email: icoce@etpub.com | **Tel.:** +86-18117808141
ICOCE Website: http://www.icoce.org/

978-981-97-5909-5, 551599_1_En, (Chapter 25), Lecture Notes in Civil Engineering, Vol. 539, Eric Strauss (Eds): Proceedings of the 8th International Conference on Civil Engineering
Inbox ×

eproofing@springernature.com
to me
Sun, Jul 28, 2024, 1:56 AM

SPRINGER NATURE

Dear Yosafat Aji Pranata,

I am happy to inform you on behalf of Springer Nature that the proofs of your book chapter "**Shear Strength of Red Meranti (Shorea Spp.) Timber at an Angle to the Grain**" are now available.

You can help us facilitate quick and accurate publication by using our e.Proofing system. The system will show you an HTML version of the chapter that you can correct online. In addition, you can view/download a PDF version for your reference.

As you are reviewing the proofs, please keep in mind the following:

- This is the only set of proofs you will see prior to publication.
- Only serious errors in content and errors introduced during the production process may be corrected.
- Any changes that contradict house style will not be made.
- Please ensure you fill out your response to any Author Queries raised during typesetting. This is necessary to enable you to submit your corrections and allow us to continue processing your chapter for publication.
- Please check the author/editor names very carefully to ensure correct spelling, correct sequence of given and family names, and that the given names and family names have been correctly designated (NB the family name is highlighted in blue).
- Please note that we standardly publish professional (institutional) e-mail addresses, but not private ones. If you have a different preference regarding publication of your email address, please indicate this clearly on the proof.

Confirmation mail for Chapter 10.1007/978-981-97-5910-1_25 Proceedings of the 8th International Conference on Civil Engineering

Inbox ×

eproofing@springernature.com Sun, Jul 28, 2024, 6:46 PM

to me

Book: Proceedings of the 8th International Conference on Civil Engineering.
DOI : 10.1007/978-981-97-5910-1
Chapter Title : Shear Strength of Red Meranti (Shorea Spp.) Timber at an Angle to the Grain.

Dear Author/Editor,

Your corrections have been submitted successfully. We will now process the corrections and finalize your work for publication. Please note that no more corrections may be submitted.

Auto Generated Email.
Springer Nature Corrections Team

27 of many

Urgent--Please finish the proof checking before September 19, 2024--ICOCE 2024

Inbox ×

ICOCE <icoce@etpub.com> Mon, Sep 16, 2024, 11:29 PM

to me

Dear Sir/Madam,

Please finish he proof checking before September 19, 2024 through https://eproofing.springer.com/ePb/index/KQk74-v9_AKBsd0FacjzsYqpi1IMAGM4kyl5huHh9AgARuQ2__78yU-68g_HelLpUVEtrZsr7yVRNR5SuFvAwiH5JX3T-zIgyHWa6TaC50s_40lHkRYMkAY8Diuhk2Ly. If there is no problem, please click "submit".

If you didn't finish it before September 19, 2024, the publishing house will publish it based on the current version.

Thanks & Regards,
Ms. Iris Tang
ICOCE 2024 Conference Secretary
Email: icoce@etpub.com | **Tel.:** +86-18117808141
ICOCE Website: http://www.icoce.org/

Your personal eBook: Proceedings of the 8th International Conference on Civil Engineering Inbox ×

Springer <springer@newsletter.springer.com>
to me

Tue, Oct 1, 2024, 10:01 PM

Your eBook has been published on SpringerLink

Springer

Congratulations!

Dear Yosafat Aji Pranata,

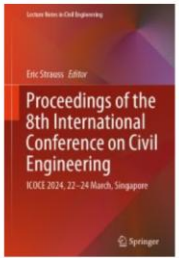
Congratulations! The eBook you contributed to has now been published on SpringerLink – our content platform, which offers customers and library patrons access to your publication at their workplace, home or wherever they want to read it. Readers who prefer a printed edition of your book will be able to order it from SpringerLink shortly.

We would like to extend our best wishes for the success of your new publication and hope you enjoyed working with us.

Proceedings of the 8th International Conference on Civil Engineering

eBook ISBN
978-981-97-5910-1

Print ISBN
978-981-97-5909-5



2024 8th International Conference on Civil Engineering

Website: http://www.icoce.org/; E-mail: icoce@etpub.com

Notification of Acceptance

Co-Sponsored by

Dear Yosafat Aji Pranata, Novi, Deni Setiawan, Vivi Arisandhy, Hendry Wong, Sof-hie Angela Hagiyanto,

Congratulations!

We are pleased to inform you that the review process for **2024 8th International Conference on Civil Engineering (ICOCE 2024)** has been completed. The conference received submissions from **15** different countries and regions, which have been reviewed by the technical program committee members and external international reviewers. Based on the recommendations of the reviewers and the international program committees, we are pleased to inform you that your paper identified below has been accepted for publication in the conference proceedings and presentation at the conference. You are cordially invited to present the paper at ICOCE 2024 to be held during March 22-24, 2024 in Singapore.

Paper ID: XJ0041

Paper Title: Shear Strength of Red Meranti (Shorea spp.) Timber at An Angle to The Grain

After rigorous peer review process, the above paper after proper registration and presentation will be published as post-proceedings in Springer book series: Lecture Notes in Civil Engineering, which will be submitted to EI Compendex, Scopus, Inspec, SCImago, ZbMATH etc for indexing.

ICOCE 2024 General Chair
Conference Organizing Committee

Registration Instruction

In order for you to attend the conference and have your paper included in the conference proceedings successfully, you must finish following steps.

1. **Revise your paper according to the Review Comments carefully.**

2. **Prepare your final revised paper by following the template.**

http://www.icoce.org/splnproc1703.docm

3. **Fast registration Link:**

http://confsys.iconf.org/register/icoce2024

Send your Final Revised Paper (Both **.doc** and **.pdf** format), Scanned Payment Proof (if you pay by bank transfer) to us at **icoce@etpub.com** by Registration Deadline (February 25th, 2024).

If you have any problem, please feel free to contact us via **icoce@etpub.com** for assistance. For the most updated information about the conference, please check the latest news on the conference website at http://www.icoce.org/. The conference schedule will be available in Middle March, 2024.

Finally, we would like to further extend our congratulations to you and we are looking forward to meeting you in Singapore!

2024 8th International Conference on Civil Engineering

Website: http://www.icoce.org/; E-mail: icoce@etpub.com

Review Form of ICOCE 2024

Singapore | March 22-24, 2024

The below manuscript which was submitted to **2024 8th International Conference on Civil Engineering** has been reviewed**.** The author should revise your manuscript by stipulated date.

Paper ID:	XJ0041
Paper Title:	Shear strength of red Meranti (shorea spp) timber at an angle to the grain

Evaluation

	Poor	Fair	Good	Very Good	Outstanding
Originality	☐	☐	☒	☐	☐
Innovation	☐	☐	☒	☐	☐
Technical Merit	☐	☐	☒	☐	☐
Applicability	☐	☐	☒	☐	☐
Presentation and English	☐	☐	☒	☐	☐
Match to Conference Topic	☐	☐	☒	☐	☐

Recommendation to Editors

	Strongly Reject	Reject	Marginally Accept	Accept	Strongly Accept
Recommendation	☐	☐	☐	☒	☐

Comments

Please briefly explain why you have made the recommendation above. Please also offer the author(s) specific guidance regarding revisions, differentiating between optional and mandatory changes. (It needs more than 80 words)

Accept with minor corrections.

The significance of the research works is not explained,
The conclusion is too short does not explain all solutions.
All the references should be mentioned in sequence in the paper. However, [11] is mentioned ahead of [10]. Please check all the references to ensure that they are mentioned in sequence.

Shear Strength of Red Meranti (*Shorea spp.*) Timber at An Angle to The Grain

Yosafat Aji Pranata[1], Novi[2], Deni Setiawan[3], Vivi Arisandhy[4], Hendry Wong[5], Sofhie Angela Hagiyanto[6]

[1,2,3,4,5,6] Faculty of Engineering, Universitas Kristen Maranatha, West Java 40513, Indonesia
[1]yosafat.ap@gmail.com

Abstract. The shear strength is one of the parameters that used for the design of beam members in wood buildings. Shear strength is also used as a parameter for bridge girder design. Red meranti (*Shorea spp*.) is a species that is easily found in Indonesia and is commonly used as a construction material for buildings, docks, or bridges. The objective of this study is to obtain an empirical equation for the shear strength with different grain angles from 0° to 10°. The research of the influence of the grain angle must be carried out under real conditions, since the direction of the wood grain is not perfectly 0° and the inclination of the grain can influence the shear strength of the wood. The method of making the specimens and the experimental methods refer to ASTM D143-22, and the total number of test specimens was 33 specimens. The tests were performed using a universal testing machine, with the test speed (crosshead) 0.6 mm/minute. The test results show that the shear strength of wood with a directional fiber angle ranging from 0° to 10° in a range from 2.77 MPa (10° grain angle) to 7.57 MPa (0° grain angle). The results of the analysis by the polynomial regression method give an empirical equation, namely $F_v = 7.03 – 0.97\theta + 0.066\theta^2$ with R-Sq = 74.7%. Fiber angle has an effect on shear strength. Empirical equations offer advantages to building designers in calculating the design capacity of wood beams, especially due to shear forces.

Keywords: Shear Strength, Red Meranti (*shorea spp*.), Timber, Angle.

1 Introduction

The shear strength is a fundamental mechanical property of timber and is used in general timber structural design such as beam of column members. The shear strength can be determined by clear specimen testing as recommended by testing standards such as ASTM D143-22 [1]. This paper has presented the outline results of a series of shear tests to determine the shear strength of Red Meranti (*Shorea spp*.) timber at an angle to the grain. The shear test procedure has been to produce shear strengths based on ASTM D143-22 [1]. It was noticed that the cracks were commonly initiated within clear timber and caused shear failure. As the grain angle increasing from zero to certain value, the mechanical properties will be decrease. The greatest influence of grain deviation angle on mechanical properties was recorded for ultimate load values.

Several previous research of wood shear testing to obtain mechanical properties of shear strength, among others, were carried out by He et.al. [2] which is studying shear testing of Spruce and Douglas-fir woods to obtain shear strength parameters and their influence on the main axis of the wood, namely in the tangential-longitudinal plane and in the radial-longitudinal plane directions, the shape of the test object and the test method refers to the ASTM D143, with the aim of obtaining shear strength parameters and failure modes. Other research has also been done by Teixeira et.al. [3] namely studying the shear strength of Angelim-pedra wood with an orientation parallel to the grain, then another research with the Red Meranti wood type was carried out by Rizki [4] namely studying the shear strength parallel to the grain (0° grain angle). In 2011 the author himself [5] also carried out experimental research to obtain shear strength parameters parallel to the grain of Red Meranti wood with a grain angle of 0°. The grain angle is a deviation of fibers from a line parallel to an edge of sawn wood. Variability in timber mechanical properties can be mainly attributed to the grain angle, beside the wood density, of course. Grain deviation from the directions of the forces causes a decrease in mechanical properties of timber [6,7,10]. A strength reduction due to the increase in the grain deviation angle was also observed in the shear strength property, the grain deviation angle from 0 to 30° causes a decrease in shear strength by about 30% to 45% [8,9] and reaching even about 70% [11].

The objective of this study is to obtain an empirical equation for the shear strength with different grain angles from 0° to 10°. The research of the influence of the grain angle must be carried out under real conditions, since the direction of the wood grain is not perfectly 0° and the inclination of the grain can influence the shear strength of the wood. The method of making the test specimens and the test methods refer to ASTM D143-22 [1], and the total number of test specimens was 33 specimens. The tests were performed using a universal testing machine, with the test speed or crosshead is 0.6 mm/minute. The significance of the research works are to obtained the empirical values of the shear strength at an angle to the grain ranged from 0° to 10°.

2 Basic Theory

2.1 Shear Strength Mechanical Properties

The shear strength is an important parameter for the design of beam members in wood buildings. Shear strength is also used as a parameter for bridge girder design. Red meranti (*Shorea spp*.) is a species that is easily found in Indonesia and is commonly used as a construction material for buildings, docks, or bridges. The objective of this study is to obtain an empirical equation for the shear strength with different grain angles from 0° to 10°. The research of the influence of the grain angle must be carried out under real conditions, since the direction of the wood grain is not perfectly 0° and the inclination of the grain can influence the shear strength of the wood.

2.2 Clear Specimen Tests

The shear specimen test shall be made on a 50 mm by 50 mm by 63 mm specimens notched in accordance with Figure 1 to produce failure on a 50 mm by 50 mm surface. The load applied to and support the specimen on end-grain surfaces. The shear tool shall include an adjustable crossbar to align the specimen and support the back surface at the base plate [1]. The shear load for calculation of the shear strength is the maximum or ultimate load that cause the failure of specimenin term of shear plane 50 mm by 50 mm. The tests were performed using a universal testing machine, with the test speed (crosshead) 0.6 mm/minute.

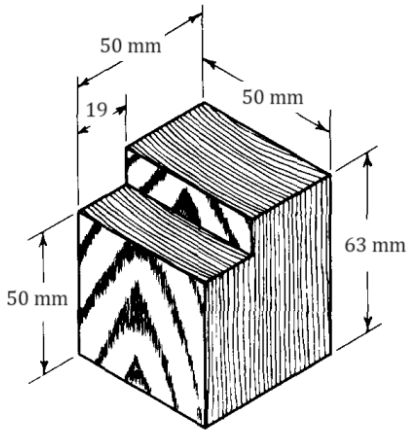


Fig. 1. The specimen for shear tests [1].

2.3 Hankinson's Formula

Elastic theory can be used to obtain the mechanical properties in directions other than along the parallel and perpendicular grain angle. Mechanical properties of wood which area elastic modulus, tensile strength, compression strength, and many more in directions ranging from parallel to perpendicular to the grain can be calculated using a Hankinson formula [10].

$$N = \frac{P.Q}{P.\sin"\theta + Q.\cos"\theta} \tag{1}$$

where N is strength at angle θ from grain angle, Q is strength perpendicular to the grain, P is strength parallel to the grain, and n is an constant [10].

2.4 Polynomial Regression Method

Polynomial regression is a regression model that is formed by adding up the influence of each independent variable raised to increasing powers up to the n-1 order. The highest power of the independent variable determines the shape of the response curve. The

polynomial model can be used to find out that there is a linear curve influence on the response, its shape resembles a curve. The polynomial model is also useful as an approximation function for very complex models and non-linear relationships [12].

3 Experimental Test and Results

3.1 Experimental Test

Shear test specimens were made from raw timber logs, which have been visually sorted to obtain defect-free parts. The number of test objects in this study was 33 test objects with grain angle variations ranging from 0° to 10°. The method of making the test specimens and the test methods refer to ASTM D143-22 [1]. Figure 2 shows some of the test object that has been made. Figure 3 shows the wood shear testing process.

Fig. 2. The specimen for shear tests.

Fig. 3. Shear tests.

3.2 Results

Figure 4 shows several examples of test results, namely the failure modes of the specimens after destructive testing to obtain the ultimate load which resulted in failure in the shear plane. Figure 5 shows the test results, namely the load versus deformation relationship curve for each test object with a grain angle direction of 0° to 10°. Table 1 and Figure 6 show the results of calculating the shear strength of wood at various angles of the grain angle. To calculate the shear strength, parameter of Cross-section of Shear Area (Figure 1) is calculated using real shear area of each specimen.

Fig. 4. Shear test result specimen with grain angle 0°.

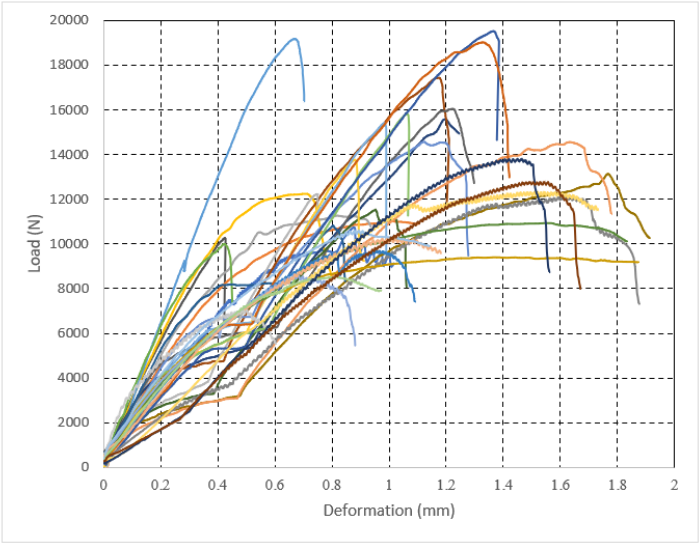


Fig. 5. Load versus deformation results obtained from experimental tests.

The test results in Table 1, namely the parameters of the shear strength of wood and the direction of the grain angle, are then processed further using quadratic type polynomial regression analysis to obtain predictions of the empirical equation for the shear strength of wood. The analysis is carried out using Minitab software [13]. The analysis results (Figure 6) show that the experimental test results, namely the ultimate load versus deformation curve, have a tendency for the ultimate load to decrease as the direction of the wood grain angle increases. This indicates that the shear strength of wood has the

highest value at the grain angle parallel to the direction of the wood grain (grain angle 0°).

Table 1. Shear load (peak) obtained from experimental tests.

Specimen	Specimen	Area (mm^2)	P_U (N)	F_v (MPa)	D_{max} (mm)	θ
K3.20	K.1	2525.55	17431.86	6.90	1.18	0
K3.50	K.2	2533.78	19018.69	7.51	1.33	0
K3.1	K.3	2531.77	19172.62	7.57	0.67	0
K3.37	K.4	2539.30	14563.99	5.74	1.13	1
K3.38	K.5	2549.24	14559.46	5.71	1.63	1
K3.45	K.6	2533.27	15401.46	6.08	0.98	1
K3.47	K.7	2526.74	15813.41	6.26	1.06	1
K3.49	K.8	2530.23	17521.24	6.92	1.37	1
K2.32	K.9	2499.49	11261.84	4.51	0.82	2
K2.34	K.10	2492.99	12239.55	4.91	0.71	2
K3.6	K.11	2521.18	13491.15	5.35	0.43	2
K3.17	K.12	2517.53	15578.01	6.19	1.20	2
K3.25	K.13	2517.02	16044.29	6.37	1.22	2
K3.34	K.14	2534.78	11515.32	4.54	0.95	2
K3.40	K.15	2534.12	12225.97	4.82	0.75	2
K3.44	K.16	2536.80	13758.22	5.42	0.88	2
K4.7	K.17	2523.70	12133.17	4.81	1.62	2
K3.32	K.18	2526.74	13135.80	5.20	1.77	3
K3.33	K.19	2520.20	10813.73	4.29	0.81	3
K4.33	K.20	2516.51	10929.15	4.34	1.57	3
K5.4	K.21	2517.20	10245.69	4.07	0.98	3
K5.13	K.22	2533.75	12327.81	4.87	1.52	3
K5.44	K.23	2520.20	13796.70	5.47	1.42	3
K5.32	K.24	2543.69	10585.16	4.16	0.89	4
K5.38	K.25	2533.72	8536.98	3.37	0.81	4
K1.32	K.26	2522.21	10261.53	4.07	0.43	5
K2.28	K.27	2515.18	11021.94	4.38	1.01	5
K4.22	K.28	2536.80	9400.73	3.71	1.38	5
K4.27	K.29	2528.58	9690.99	3.83	0.95	5
K5.45	K.30	2528.24	12769.15	5.05	1.54	6
K5.12	K.31	2531.42	7018.90	2.77	0.50	7
K2.2	K.32	2503.94	10748.10	4.29	0.88	8
K5.1	K.33	2538.13	8623.11	3.40	0.67	10

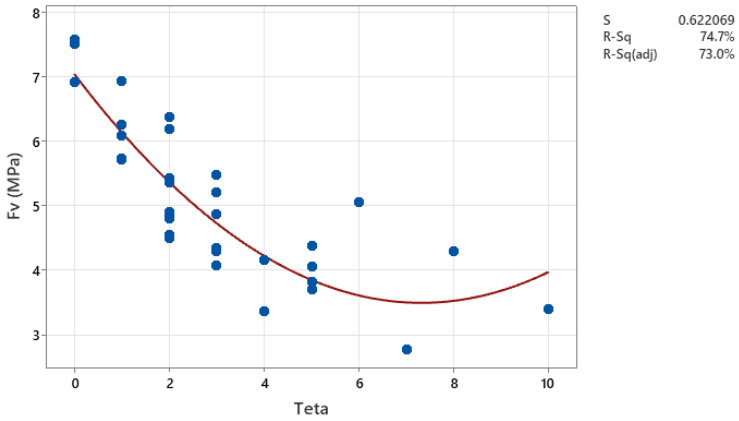


Fig. 6. Results obtained from study: Equation to predict the shear strength at an angle to the grain.

Results obtained from study which is qquation to predict the shear strength at an angle to the grain show in Equation 2.

$$F_v = 7.03 – 0.97\theta + 0.066\theta^2 \quad (2)$$

$$\text{R-Sq} = 74.7\% \quad (3)$$

4 Conclusion

The test results show that the shear strength of wood with a directional fiber angle ranging from 0° to 10° in a range from 2.77 MPa (10° grain angle) to 7.57 MPa (0° grain angle). The results of the analysis by the polynomial regression method give an empirical equation, namely $F_v = 7.03 – 0.97\theta + 0.066\theta^2$ with R-Sq = 74.7%. Fiber angle has an effect on shear strength. Empirical equations offer advantages to building designers in calculating the design capacity of wood beams, especially due to shear forces.

Acknowledgement

Authors would like to acknowledged Department of Civil Engineering, Faculty of Engineering, Universitas Kristen Maranatha for financial support for the research “Skema Tambahan” fiscal year 2021. Authors are also would like to acknowledged due to the Structural Laboratory for conducting timber shear testing.

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Shear Strength of Red Meranti (*Shorea spp.*) Timber at An Angle to The Grain

Yosafat Aji Pranata[1], Novi[2], Deni Setiawan[3], Vivi Arisandhy[4], Hendry Wong[5], Sofhie Angela Hagiyanto[6]

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Abstract. The shear strength is one of the parameters that used for the design of beam members in wood buildings. Shear strength is also used as a parameter for bridge girder design. Red meranti (*Shorea spp*.) is a species that is easily found in Indonesia and is commonly used as a construction material for buildings, docks, or bridges. The objective of this study is to obtain an empirical equation for the shear strength with different grain angles from 0° to 10°. The research of the influence of the grain angle must be carried out under real conditions, since the direction of the wood grain is not perfectly 0° and the inclination of the grain can influence the shear strength of the wood. The method of making the specimens and the experimental methods refer to ASTM D143-22, and the total number of test specimens was 33 specimens. The tests were performed using a universal testing machine, with the test speed (crosshead) 0.6 mm/minute. The test results show that the shear strength of wood with a directional fiber angle ranging from 0° to 10° in a range from 2.77 MPa (10° grain angle) to 7.57 MPa (0° grain angle). The results of the analysis by the polynomial regression method give an empirical equation, namely $F_v = 7.03 – 0.97\theta + 0.066\theta^2$ with R-Sq = 74.7%. Fiber angle has an effect on shear strength. Empirical equations offer advantages to building designers in calculating the design capacity of wood beams, especially due to shear forces.

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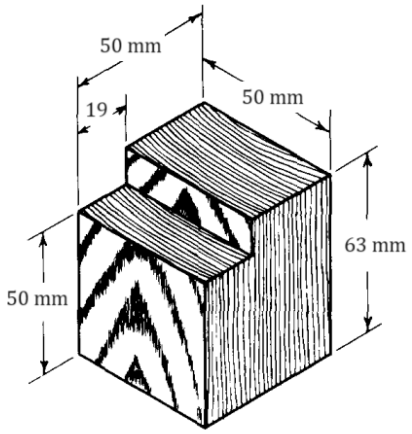

Fig. 1. The specimen for shear tests [1].

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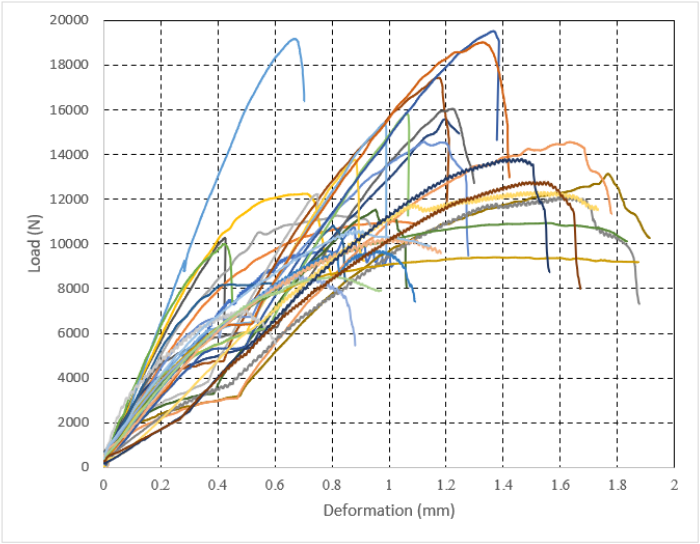
Fig. 4. Shear test result specimen with grain angle 0°.



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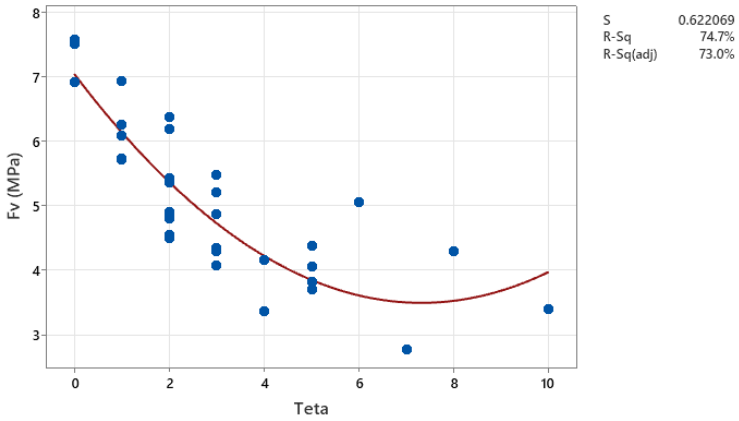

Fig. 6. Results obtained from study: Equation to predict the shear strength at an angle to the grain.

Results obtained from study which is qquation to predict the shear strength at an angle to the grain show in Equation 2.

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$$\text{R-Sq} = 74.7\% \quad (3)$$

4 Conclusion

The test results show that the shear strength of wood with a directional fiber angle ranging from 0° to 10° in a range from 2.77 MPa (10° grain angle) to 7.57 MPa (0° grain angle). The results of the analysis by the polynomial regression method give an empirical equation, namely $F_v = 7.03 – 0.97\theta + 0.066\theta^2$ with R-Sq = 74.7%. Fiber angle has an effect on shear strength. Empirical equations offer advantages to building designers in calculating the design capacity of wood beams, especially due to shear forces.

Acknowledgement

Authors would like to acknowledged Department of Civil Engineering, Faculty of Engineering, Universitas Kristen Maranatha for financial support for the research “Skema Tambahan” fiscal year 2021. Authors are also would like to acknowledged due to the Structural Laboratory for conducting timber shear testing.

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ICOCE 2024

2024 8th International Conference on Civil Engineering

AREEE 2024

2024 5th Asia Conference on Renewable Energy and Environmental Engineering

Singapore | March 22-24, 2024

Co-sponsored by Sensors and Systems Society of Singapore

Table of Contents

Conference Location

Conference Venue Name

Mercure Singapore Bugis

Address

122 Middle Road, 188973, Singapore
(https://www.mercure-singapore-bugis.com/)

Queen III, Level 2

Queen II, Level 2

Royale Restaurant, Level 3

Conference Location Introduction

Welcome to a contemporary 4-star hotel in the vibrant enclave of Bras Basah, Bugis in Singapore. The fun design reflects the colourful charm and heritage of a neighbourhood within Bugis that has it all. Majestic places of worship, historic monuments, street markets, shopping malls and a surplus of appeal. Explore Arab Street ’s Middle Eastern ambiance and Orchard Road ’s numerous boutiques. Visit the National Library or Museum. Or simply stroll through the lanes and admire the architecture within the Bugis area – a captivating blend of old and new. There are very few high rise in the area. At 15-storey high, the hotel is one of them – affording it a picturesque sky deck and clear views of the city from many of our rooms and loft suites.

The hotel is also one of the new dining and event destinations in Singapore within Bugis, with two restaurants, a lounge bar, private dining options, a ballroom and meeting facilities.

Located in the central business district, this modern hotel is a 6-minute walk from MRT Station, 6 km from Singapore Botanic Gardens and 9 km from Universal Studios Singapore.

Simple room with Wi-Fi, flat-screen TV and minibar. Many rooms offer city views, while some have loft bedrooms. Guests staying in club level rooms have access to the lounge, which offers free breakfast and cocktails. Room service is available 24 hours a day.

It features a Chinese restaurant, a steakhouse and a stylish lobby bar. Other facilities include a gym, an outdoor pool with a bar, a business centre and 3 meeting rooms.

Check-in time: 15:00

Check-out time: 12:00

Welcome Message

Welcome to attend 2024 8th International Conference on Civil Engineering (ICOCE 2024) and 2024 5th Asia Conference on Renewable Energy and Environmental Engineering (AREEE 2024), Singapore during March 22-24, 2024. On behalf of organizing committee, we sincerely appreciate your great support to the conference.

This conference program is highlighted by two outstanding Keynote Speakers and three Invited Speakers. ICOCE 2024 and AREEE 2024 consist of 59 oral presentations and 9 poster presentations, and there are more than 70 participants in total.

We express our sincere appreciation to all the individuals who have contributed to ICOCE 2024 and AREEE 2024 conference in various ways. Special thanks are extended to our colleagues in program committee for their thorough review of all the submissions, which is vital to the success of the conference, and also to the members in the organizing committee who had given their valuable time and efforts in planning, promoting, organizing and helping the conference. The conference will provide opportunities for the delegates from different areas to exchange new ideas and application experiences face to face, to establish business or research relations and to find global partners for future collaboration. It is a great platform to discuss the most recent innovations, trends, and concerns, practical challenges encountered and the various solutions in the fields of Civil Engineering and Renewable Energy & Environmental Engineering.

Wish all of you have a wonderful experience during the conference. Meanwhile, we warmly welcome you to join our conference next year!

Conference Organizing Committee

Conference Committee

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Prof. Krishna Kumar Singh, National Institute of Technology Kurukshetra, India
Prof. Ramesh Srikonda, School of Planning and Architecture, India
Dr. Baoxin Liu, Future City Laboratory, Innovation Center of Yangtze River Delta, Zhejiang University, China

Presentation Guidelines

Devices Provided by the Conference Organizer:
Laptop Computer (MS Windows Operating System with MS PowerPoint and Adobe Acrobat Reader)
Digital Projectors and Screen
Laser Sticks

Materials Provided by the Presenters:
PowerPoint or PDF Files (Files should be copied to the Conference laptop at the beginning of each Session.)

Please do arrival registration. On March 22, 2024, we will have arrival registration and conference materials collection.

For participants who will attend the physical conference, the organizer doesn't provide accommodation, and we suggest you make an early reservation.

Instructions for Online Presentations

➢ **Time Zone**

The time shown in this schedule is **Greenwich Mean Time+8 (GMT+8) Please set-up your laptop time in advance.**

➢ **Equipment Provided by the Presenters**

1. A computer with an internet connection (wired connection recommended)
2. USB plug-in headset with a microphone (recommended for optimal audio quality)
3. Webcam (optional): built-in or USB plug-in

➢ **Environment requirement**

1. Quiet Location and Proper lighting
2. Stable Internet Connection
3. Suitable Background

How to use ZOOM

Step 1: Download Zoom from the link: **https://zoom.us/download**

China Mainland Users: https://www.zoom.com.cn/download

Step 2: Sign up an account.

Step 3: Set up the languages and do some basic test.

Step 4: Get familiar with the basic functions: Rename, chat, raise hands, and screen share, etc.

1. **Rename:** Before you enter the conference room, please change your name to Paper ID + Name
2. **Chat and raise your hand:** During the session, if you have any questions about the operation of zoom, please let us know by clicking "raise your hands" and use "chat" to communicate with conference secretary

   During the Question section, if you have any questions about keynote speakers or authors, you

can also click “raise your hands” or “chat”

3. **Share Screen:** Please open your power point first, and then click “share screen” when it’s your turn to do the presentation.

Notes: How to join the conference online

1. Find your paper ID and suitable meeting ID on the conference program.
2. Open the ZOOM, click the join, paste the meeting ID, then you can join the conference.
3. Click the stop share after you finish your presentation

Duration of Each Presentation

Keynote Speech: about 35 Minutes of Presentation and 5 Minutes of Question and Answer
Invited Speech about 15 Minutes of Presentation and 5 Minutes of Question and Answer
Regular Oral Presentation: about 12 Minutes of Presentation and 3 Minutes of Question and Answer

Dress code

Please wear formal clothes or national representative of clothing.

Instructions for Poster Presentation

Materials Provided by the Conference Organizer:
The place to put poster

Materials Provided by the Presenters:
Home-made Posters
Maximum poster size is A1
Load Capacity: Holds up to 0.5 kg

Conference Brief Schedule (GMT+8)

Day 1-March 22, 2024 | Friday		
Onsite		
10:00-17:00	Onsite Registration & Materials Collection	Hotel Lobby
Online		
14:00-16:00	Test for online participants	zoom
Day 2-March 23, 2024 | Saturday		
Onsite		
09:00-09:05	Opening Remarks-ONG Ghim Ping Raymond, National University of Singapore, Singapore	Queen III, Level 2
09:05-09:45	**Chair: ONG Ghim Ping Raymond, National University of Singapore, Singapore** Keynote Speech I- Joseph Kim, California State University Long Beach, USA	
09:45-10:25	**Chair: Joseph Kim, California State University Long Beach, USA** Keynote Speech II- ONG Ghim Ping Raymond, National University of Singapore, Singapore	
10:25-10:40	***Group photo & Coffee Break***	
10:40-11:00	**Chair: Joseph Kim, California State University Long Beach, USA** Invited Speech I- Kwun Nam HUI, University of Macau, China	
11:00-12:30	Session 1: Wastewater Treatment and Water Quality Analysis	Queen III, Level 2
	Session 2: Renewable Energy and Electric Motor Technology	Queen II, Level 2
12:30-13:40	***Lunch Time***	Royale Restaurant, Level 3
13:40-14:00	**Chair: Kwun Nam HUI, University of Macau, China** Invited Speech II- Kim Yongmin, University of Glasgow, Singapore	Queen III, Level 2
14:00-15:45	Session 3: Infrastructure Engineering and Hydraulic engineering	Queen III, Level 2
	Session 4: Properties of Building Materials and Structures	Queen II, Level 2
15:45-15:55	***Coffee Break***	
15:55-16:15	**Chair: Kwun Nam HUI, University of Macau, China** Invited Speech III-Chian Siau Chen, Darren, National University of Singapore, Singapore	Queen III, Level 2
16:15-18:30	Session 5: Environmental Pollution Control and Resource Management	Queen III, Level 2
16:15-18:00	Session 6: Seismic Response of Engineering Structures and Construction Management	Queen II, Level 2
14:00-18:00	Poster Session	Queen III, Level 2
18:30	***Dinner***	Queen I, Level 2
Day 3-March 24, 2024 | Sunday		
13:30-16:15	Session 7: Building Materials, Building Environment, and Construction Management	zoom
16:30-18:30	Session 8: Engineering Vibration and Mechanical Properties of Building Structures	

Online Room ID: 890 8696 8540 Link: https://us02web.zoom.us/j/89086968540

Keynote Speaker I

March 23, 2024 (Saturday) 09:05-09:45 | GMT+8

Venue: Queen III, Level 2

Prof. Joseph Kim

California State University Long Beach, USA

Dr. Joseph J. Kim, P.E. is a Professor at the Department of Civil Engineering and Construction Engineering Management at California State University Long Beach. Dr. Kim spent several years as a field engineer and safety engineer. He is a registered professional engineer and holds a LEED AP BD+C certification. He is the recipient of 2011 ASCE ExCEEd New Faculty Excellence in Teaching Award, 2013 ICCEPM Best Paper Award, 2016 KSEA Chapter President Award; 2020 and 2021 USA President's Volunteer Service Awards. His research interests include artificial intelligence (AI) applications to solve civil infrastructure systems' optimization problems, green building materials, best sustainability practices in built environments, building information modeling, cost estimating methods, construction robotics, project delivery systems, and statistical methods for construction engineers. Dr. Kim has authored 117 journal articles and conference papers in high-quality engineering and scientific journals such as the ASCE Journal of Construction Engineering and Management, Journal of Green Buildings, Canadian Journal of Civil Engineering, and Journal of Transportation Research Board. Dr. Kim is an active member of the American Society of Civil Engineers (ASCE), ASCE's Construction Research Council of the Construction Institute, and Korean American Scientists and Engineers Association (KSEA). He is a peer reviewer for many technical journals.

Speech Title---Decarbonation: The Power of Green Building Materials against Climate Change

Abstract-In today's dynamic climate change landscape, decarbonization efforts within the architecture, engineering, and construction (AEC) industry are paramount. In this keynote, I will delve into the transformative potential of innovation through the lens of green building materials. I will explore current research and development trends in the market, emphasizing how embracing innovation can drive success in combating climate change. I will start by examining the use of green building materials, crafted with a focus on minimizing carbon emissions across their lifecycle, from extraction to disposal. Through real-world examples and cutting-edge research, I will showcase how these materials significantly reduce building footprints, accelerating decarbonization goals. Furthermore, I will discuss the energy efficiency benefits of green materials, including high-performance insulation and reflective roofing, which decrease energy demand for heating, cooling, and lighting. This translates to lower carbon emissions from energy generation, further advancing decarbonization objectives. Then, I will highlight the importance of renewable resources such as bamboo, reclaimed wood, and recycled steel and plastics in construction, reducing reliance

on finite resources and minimizing environmental impact. These materials align with sustainability goals and contribute to decarbonization efforts. Additionally, I will introduce policies, building codes, incentive programs, and certification programs incentivizing the use of green materials, fostering broader decarbonization strategies. Compliance with these standards can significantly accelerate decarbonization efforts at various levels of governance. In conclusion, I aim to inspire continued research and development in creating innovative green building materials. By doing so, we can effectively combat global climate change, creating a sustainable society for future generations.

Keynote Speaker II

March 23, 2024 (Saturday) 09:45-10:25 | GMT+8

Venue: Queen III, Level 2

Assoc. Prof. ONG Ghim Ping Raymond

National University of Singapore, Singapore

Dr ONG Ghim Ping Raymond is an Associate Professor and Associate Head (Research) in the Department of Civil and Environmental Engineering at the National University of Singapore (NUS). He graduated with a B.Eng (Civil) (First Class Honours) with a minor in Business from the National University of Singapore in 2003 and obtained his PhD in Civil Engineering from the National University of Singapore in 2007. Prior to his current appointment, he worked as a postdoctoral research associate in the School of Civil Engineering at Purdue University from 2007 to 2008, a visiting assistant professor in the same university in 2009 and then a lecturer (from 2010 to 2014) and assistant professor (2014-2020) in the Department of Civil and Environmental Engineering at the National University of Singapore.

Dr Ong's research interests include pavement materials and engineering, and multimodal transport infrastructures and operations, with emphasis on future mega-transport infrastructures/operations (such as car-lite/car-free towns, next generation seaports and airports). He has authored or co-authored over 70 peer-reviewed journal articles as well as over 100 international conference papers in these research areas. He is also actively involved in translational research grants/projects related to the engineering development of critical mega-infrastructures in Singapore (including the Tuas mega-port, Changi East Development, and Woodlands Checkpoint).

Dr. Ong is currently serving in various scientific committees in the Transportation Research Board of the National Academies, the American Society of Civil Engineers, the America Society of Testing and Materials and the Eastern Asian Society of Transportation Studies. He is also currently serving in editorial roles in several peer-reviewed international journals. He has received several scientific awards in recognition to his achievements in transportation research, including the Alfred Noble Prize (ASCE), the Hanjin Prize (IAME), the inaugural Takeuchi Yoshio Award (OCDI) and the inaugural iSMARTi Early Career Award. His research expertise and achievements have also led to him to serve as consultant to agencies and companies such as Changi Airport Group, Defence Science and Technology Agency, Surbana Jurong Infrastructures Pte Ltd, Global Maritime and Port Services Pte Ltd, and the Korean Maritime Institute.

Dr. Ong is also passionate about sharing his thoughts on current and future issues related to his research expertise to the public. He has frequently appeared in mainstream print or internet media (such as Straits Times, Lianhe Zaobao, The New Paper, Today Online) and live or pre-recorded TV interviews (such as Channel NewsAsia, Channel 8 info-ed programs and news, and Suria info-ed programs) speaking on issues on transport infrastructure and operations, active mobility and car-lite/car-free initiatives.

Speech Title---Moving towards a Liveable Car-lite City: A Research Perspective in the Singapore Context

Abstract-This lecture shares the key aspects of a liveable car-lite city and why it is necessary as the world faces issues of urbanisation, climate change and limited resources. In particular, initiatives such as integrated land use transportation planning, consideration of liveability and safety in modern mobility planning (especially in the context of active mobility), and moving towards electric vehicles, electric fleet and autonomous connected vehicles shall be discussed. Future prospects on promoting a liveable car-lite city shall also be discussed.

Invited Speaker I

March 23, 2024 (Saturday) 10:40-11:00| GMT+8

Venue: Queen III, Level 2

Assoc. Prof. Kwun Nam HUI

University of Macau, China

Dr. Kwun Nam HUI, is an Associate professor at the Institute of Applied Physics and Materials Engineering, University of Macau. He obtained Ph.D. degrees in Electrical and Electronic Engineering from the University of Hong Kong in 2009. He has been working as Assistant professor (2009-2013) and Associate professor (2013-2015) in School of Materials Science and Engineering at Pusan National University. As Principle Investigator, he has managed 36 research projects including 4 projects from National Research Foundation of Korea with a total research grant of USD 2 million. His research has led to 1 US patent, 7 granted CN patents, 17 CN patent-pending, 10 granted KR patents, and 250 SCI journal papers. Dr. KN Hui has h-index (Google): 57; Citations: 9924. His current research interests include Li/Na/K/Al-ion batteries, hybrid Na-air battery, fuel cell, as well as metal/heteroatom-doped carbon electrocatalysis for oxygen reduction reaction, oxygen evolution reaction, and hydrogen evolution reaction.

Speech Title---Advances in Potassium-ion Batteries: Materials Design and Solid Electrolyte Interface Analysis

Abstract-Energy storage plays a pivotal role across a wide range of applications, including portable electronics, electric vehicles, and renewable energy integration. Presently, lithium-ion batteries (LIBs) are extensively used for various applications due to their unique features. However, concerns have arisen regarding their feasibility and long-term sustainability, owing to the scarcity and uneven geographical distribution of lithium resources. Amidst these considerations, potassium-ion batteries (PIBs) have attracted substantial interest due to their cost-effectiveness and widespread availability. Nonetheless, the significant ionic radius of potassium ions (1.38 Å) presents challenges within graphite electrodes, resulting in electrode materials that demonstrate diminished capacity and limited cyclic stability in PIBs. Among the various reported anode materials for PIBs, phosphorus-based electrodes stand out with the most remarkable theoretical specific capacity (2596 mA h g−1). Unfortunately, these electrodes experience notable volume expansion during operation, leading to reduced capacity and insufficient cycling stability.

In this presentation, I will demonstrate that phosphorus-based electrodes in PIBs hold the potential to emerge as competitive alternatives to LIBs for large-scale, sustainable, eco-friendly, and secure energy storage systems. Strategies to enhance the capacity of phosphorus-based electrodes, improve cycling stability, and enhance the electrolyte safety of PIBs will be explored. Of paramount

significance, X-ray photoelectron spectroscopy (XPS) has been utilized to reveal essential insights into the dynamic evolution of solid electrolyte interphases on phosphorus-based anodes in organic phosphate-based electrolytes. This approach provides an explanation for the extended cycling stability observed in these systems. Lastly, approaches to enhance the cathode electrode for PIBs will also be discussed.

Invited Speaker II

March 23, 2024 (Saturday) 13:40-14:00| GMT+8

Venue: Queen III, Level 2

Dr. Kim Yongmin

University of Glasgow, Singapore

Dr. Kim Yongmin is an Assistant Professor at the James Watt School of Engineering, University of Glasgow, specifically in Singapore campus. He completed his PhD in the School of Civil and Environmental Engineering at Yonsei University, Seoul, Korea, in 2015. His research lab, Digital Geotechnical Engineering Lab (DGEL), is focused on Urban Disasters & Sustainable Urban Development. The lab uses deep-layered neural networks, machine learning, extensive laboratory experiments, field testing, and coupled multidisciplinary analyses to conduct their studies. Dr Kim Yongmin's research focuses on unsaturated soil mechanics to solve geotechnical problems associated with tropical residual soils. His research emphasis has been on rainfall-induced landslides, one of the major natural disasters occurring in many parts of the world. He has utilized unsaturated soil mechanics principles to better understand the mechanisms of rainfall-induced slope failures, particularly in tropical residual soils. Dr Kim Yongmin and his team have developed several systems, including the Capillary Barrier System (CBS), GeoBarrier System (GBS) for cover systems and retaining structures, as well as a Slope Management and Susceptibility Geographical Information System. They have also applied unsaturated soil mechanics to soil improvement for tree stability, understanding the effects of rainfall on tree stability, and developed instruments for tree inclinometer with the associated analytics.

Speech Title---Role of Unsaturated Soil Mechanics in Rainfall-induced Slope Failure

Abstract-The principles of unsaturated soil mechanics are essential for understanding various geotechnical problems related to soils above the water table. Though there has been growing interest in using unsaturated soil mechanics to evaluate the behavior of unsaturated soil slopes, we are not paying as much attention as it was meant to be deserved. Hence, this talk will focus on rainfall-induced slope failure and the application of unsaturated soil mechanics to forensic analysis of slope instability.

Invited Speaker III

March 23, 2024 (Saturday) 15:55-16:15| GMT+8

Venue: Queen III, Level 2

Assoc. Prof. Chian Siau Chen, Darren

National University of Singapore, Singapore

Dr. Chian Siau Chen, Darren is an Associate Professor at the Department of Civil and Environmental Engineering at the National University of Singapore (NUS). Dr. Chian is also the Director of the Centre for Soft Ground Engineering in the university. Dr. Chian obtained his Ph.D. and B.Eng. from Cambridge University and Nanyang Technological University respectively. Dr. Chian actively involves in collaborative research projects with local government agencies to recycle unwanted soils from underground construction projects as land reclamation fill materials. Dr. Chian has also expanded recycling waste material into useful pozzolans in supplementary cementitious material technology. Dr. Chian was named as Asia's Top 10 Innovators under 35 (TR35) by the MIT Technology Review in 2016, GeoSS Promising Young Geotechnical Engineer Award in 2018, Enterprise Singapore SAC Distinguished Award in 2018, Ministry of Transport Distinguished Minister Innovation (Distinguished) Award in 2021, Award Finalist of the Land Transport Excellence Award (Most Innovative Solution) and Prominent Geotechnical Engineer Award in 2022. Dr. Chian is the current President of the Geotechnical Society of Singapore (GeoSS).

Speech Title---Climate Effect on Cementitious Ground Improvement Technology

Abstract-Cement stabilisation of soft ground is a popular ground improvement methodology used worldwide. In tropical regions, the stabilisation of soil at elevated temperature and humidity is little studied. This is further aggravated by limited international standards for cement-soil stabilisation. In classic concrete technology, higher ambient temperature would result in a higher early stage, but lower later age strength as compared to one cured at reference temperature of 23 degree Celsius. This is commonly termed as a cross-over effect. In contrast, strength development of cement-soil stabilisation does not show cross-over effect in this study. Higher unconfined strength with denser microstructure were persistent at both early and later stage of curing owning to clay pozzolanic reaction on top of cement hydration, which infers the benefit of elevated temperature in cement stabilisation in cases of increased climatic temperature.

Session 1

Wastewater Treatment and Water Quality Analysis Chair: Assoc. Prof. Khyle Glainmer N. Quiton, Mapúa University, Philippines	
11:00-12:30 (GMT+8) March 23, 2024 (Saturday)	Venue: Queen III, Level 2
XJ5012-A 11:00-11:15	*Optimization of Dual Coagulation Parameters for Turbidity Removal of Philippines' Pasig River Water Using Box-Behnken Design Model* **Khyle Glainmer N. Quiton**, Noreen Caryl G. Reyes, Rance Nicolo S. Villena, and Michelle C. Almendrala Mapúa University, Philippines
XJ5011-A 11:15-11:30	*Degradation of Pyrene in Groundwater of Coking Plant by Ferrous Activated Sustained Release Persulfate* **Xueqiang Zhu**, Qin Qiu, Hong Yang, Lai Zhou, and Qiyan Feng China University of Mining and Technology, China
XJ5019-A 11:30-11:45	*Macrophyte Assisted Vermifiltration for the Treatment of Cattle Feedlot Wastewater* **Rajneesh Singh**, Shruti Singh, and Brijesh Kumar Yadav IIT Roorkee, India
XJ5013 11:45-12:00	*Sequential Dual Coagulation and Photo-Fenton Oxidation for Real Distillery Wastewater Treatment* **Khyle Glainmer N. Quiton**, Ian Carlo T. Abareta, Cyrus Alexander D. Vizon and Michelle C. Almendrala Mapúa University, Philippines
XJ5042-A 12:00-12:15	*Effects of co-Existing Parameters on the Adsorption of Perfluorooctanoic Acid (PFOA)an Activated Charcoal* **Aung Thit Htun** and Dao Janjaroen Chulalongkorn University, Thailand
XJ5028-A 12:15-12:30	*Development of Eutrophication Index for Lakes* Harshita Modi and **M Mansoor Ahammed** Sardar Vallabhbhai National Institute of Technology, India

Session 2

Renewable Energy and Electric Motor Technology Chair: Assoc. Prof. Pirat Khunkitti, Khon Kaen University, Thailand	
11:00-12:30 (GMT+8) March 23, 2024 (Saturday)	**Venue: Queen II, Level 2**
XJ5005-A 11:00-11:15	*High Torque Density Axial Flux Permanent Magnet Motor for Electric Vehicles* **Kantapat Tonchua**, Apirat Siritaratiwat and Pirat Khunkitti Khon Kaen University, Thailand
XJ5036-A 11:15-11:30	*Concentrated Solar Power Generation in Kuwait* **Haitham Yousef Safar** KOC, Kuwait
XJ5006-A 11:30-11:45	*Optimization Design of Skewed Halbach-Array Permanent Magnet Arrangement in Axial-Flux Permanent Magnet Machine for Torque Capability Improvement* **Phuson Srikhumphun**, Apirat Siritaratiwat, and Pirat Khunkitti Khon Kaen University, Thailand
XJ5045-A 11:45-12:00	*Recyclable Thermoplastic Wind Turbine Blades* **Edrea Phua** Loughborough University, UK
XJ5010-A 12:00-12:15	*Enhanced Model Reference Adaptive System Speed Sensorless Model Predictive Control of an Interior Permanent Magnet Synchronous Motor Using PSO Algorithm* **Supanat Chamchuen**, Apirat Siritaratiwat and Pirat Khunkitti Khon Kaen University, Thailand
XJ5002-A 12:15-12:30	*Dynamic Energy Management Strategy of a Solar-and-Energy Storage-integrated Smart Charging Station* Kuo-Yang Wu, Tzu-Ching Tai, Bo-Hong Li and **Cheng-Chien Kuo** National Taiwan University of Science and Technology, Taiwan

Session 3

Infrastructure Engineering and Hydraulic Engineering Chair: Prof. Krishna Kumar Singh, NIT Kurukshetra, India	
14:00-15:45 (GMT+8) March 23, 2024 (Saturday)	**Venue: Queen III, Level 2**
XJ0003 14:00-14:15	*A Hybrid Genetic Algorithm - Artificial Neural Network Model for Cost Estimation and Corruption Detection of Public Road Rehabilitation Projects in Quezon City* **Christopher Jose Carlos** and Angelo Benjamin Dizon University of the Philippines, Philippines
XJ0008 14:15-14:30	*An Integrated Design Method for Public Buildings with Digital Technology Collaboration： Taking Three Practical Projects as Examples* **Di Ai** Architects & Engineers Co., LTD. of Southeast University, China
XJ0028 14:30-14:45	*Mitigation Measures to Protect the Quality of Life in an Expansion of Thailand's Mega Port* **Cherdvong Saengsupavanich,** Lanlila Chitsom, Sarinya Sanitwong-Na-Ayutthaya, Phansak Iamraksa, Salisa Wangtong, Worawut Poma, Naruphun Chotechuang and Nuttikan Saejew Kasetsart University, (Sri Racha Campus), Thailand
XJ0030 14:45-15:00	*Local Scour Studies on Spur Dyke with Grouped Piles* **Arun Goel** and Neeraj Pandey National Institute of Technology Kurukshetra, India
XJ0017 15:00-15:15	*Infrastructure and Sustainable Development Goals: Unveiling Latent Factors in Bangkok* **Ketsutee Ngamgwong** and Piyanut Wethyavivorn Kasetsart University, Thailand
XJ0038-A 15:15-15:30	*Advancing Rainfall Intensity-Duration-Frequency (IDF) Curves: A Regional Pooling Group Approach for Improved Accuracy in Singapore* **Samiran Das** and Yongmin Kim University of Glasgow, Singapore
XJ0053 15:30-15:45	*Urban Flood Resilience: A Comparative Exploration of Rain Garden Infiltration with Diverse Vegetation* **Krishna Kumar Singh** and Sandeep Kumar National Institute of Technology Kurukshetra, India

Session 4

Properties of Building Materials and Structures Chair: Prof. Joseph Kim, California State University Long Beach, USA	
14:00-15:45 (GMT+8) March 23, 2024 (Saturday)	**Venue: Queen II, Level 2**
XJ0019 14:00-14:15	*Influence of Nano Ceramic Waste Powder on the Properties of Interlocking Bricks* **Niragi Dave,** Nency Chavda and Dorji Pandit Deendayal Energy University, India
XJ0022-A 14:15-14:30	*Pore Structure of Alkali Residue-based Lightweight Soil and Its Influence on Physical and Mechanical Properties Based on X-ray Computed Tomography* **Zhengcheng Wang** Southeast University, China
XJ0013-A 14:30-14:45	*A Study of the Effect of Geopolymer Repair Materials on Interfacial Bonding Properties* **Ke Wang** Xi'an University of Architecture and Technology, China
XJ0023-A 14:45-15:00	*An Innovative MgO-carbonated Composite Pile in Ground Improvement* **Yizhao Liu** Southeast University, China
XJ0048 15:00-15:15	*Self-Compacting Geo-Polymer Concrete: A Critical Review* Huma Afrin, **Alfia Bano** and S.V. Deo National Institute of Technology, India
XJ0052 15:15-15:30	*Preparation of Porous Concrete Suitable for Vegetation Growth: An Approach Towards Green Infrastructure* **John Bosco Niyomukiza**, Amin Eisazadeh and Som-nuk Tangtermsirikul Thammasat University, Thailand
XJ0012 15:30-15:45	*Experimental and Numerical Study of Full-size Reinforced Geopolymer Concrete Beams* **Borui Wu** and Yao Yao Xi'an University of Architecture and Technology, China

Session 5

Environmental Pollution Control and Resource Management Chair: Assoc. Prof. Kwun Nam HUI, University of Macau, China	
16:15-18:30 (GMT+8) March 23, 2024 (Saturday)	**Venue: Queen III, Level 2**
XJ5031-A 16:15-16:30	*Hydrochloric Acid Leaching of Lithium Iron Batteries* **Yu-Rui Huang**, Ching-Hwa Lee, Lim, Kimberly Hannah T., and Tz-Leun Huang Da-Yeh University, Taiwan
XJ5046-A 16:30-16:45	*An Integrated Process: CO_2 Capture and Carbonation* Kit Huan Tham, Terence Seah, **Qing Yue Kouk,** Jiawei Liu, Cun Wang, Jie Bu, Longgang Tao Institute of Sustainability for Chemicals, Energy and Environment, Singapore
XJ5043-A 16:45-17:00	*Reversible Detection of Heavy Metal Ions in Blood and Water Utilizing Polypropylene Waste* **Sweety Rani**, Dheeraj Kumar, Bhanu Nandan, and Rajiv K. Srivastava Indian Institute of Technology Delhi, India
XJ5032-A 17:00-17:15	*Multicomponent Heterojunction Photocatalysts via Non-noble Metal Plasmatic Nanoparticles Promote the Photoreduction of CO_2 to C_2H_5OH* **Haitao Yu** and Yimin Xuan Nanjing University of Aeronautics and Astronautics, China
XJ5025-A 17:15-17:30	*The Spatiotemporal Pattern of Methane Emissions Embodied in the Global Natural Gas Trade* **SiJia Gao**, HaoRan Mao, and Bo Zhang China University of Petroleum (East China), China
XJ5033-A 17:30-17:45	*Comparison of Photocatalytic CO_2 Reduction Performance of $ZnIn_2S_4$ Catalyst in Liquid Suspension and Three-phase Reaction Mode* **Jin Wang** and Yimin Xuan Nanjing University of Aeronautics and Astronautics, China
XJ0070 17:45-18:00	*Assessment of Life Cycle Energy and Green House Gas of a Two Storied Residential building in Central India Using Open Source Data* A D Prasad, **Ajay Vikram Ahirwar** and Padma Ganasala National Institute of Technology Raipur, India
XJ5037-A 18:00-18:15	*Pd Deposited $FeVO_4/ZrO_2$ Visible Active Photocatalysts for Organic Pollutant Degradation* **Naveen Kumar** and Monika Kumari Maharshi Dayanand University, India
XJ0056 18:15-18:30	*Noise Monitoring During Ganesh Chaturthi, Dussehra and Diwali Festival for Raipur City, India* **A. D. Prasada,** Ajay Vikram Ahirwara, Vishal Kumara and Sahil Ali National Institute of Technology Raipur, India

Session 6

Seismic Response of Engineering Structures and Construction Management Chair: Assoc. Prof. Chian Siau Chen, Darren, National University of Singapore, Singapore	
16:15-18:00 (GMT+8) March 23, 2024 (Saturday)	**Venue: Queen II, Level 2**
XJ0045-A 16:15-16:30	*Impact of Train Formation in Numerical Simulation on Operational Safety Analysis of Trains under Uniform Seismic Motion* **Kangming Zhong** Beijing University of Technology, China
XJ0015-A 16:30-16:45	*Development of New Passive Vibration Control System using Pulley Mechanism Installed at Continuous Multiple-story* **Majima Ryo** Toyohashi University of Technology, Japan
XJ0046-A 16:45-17:00	*Considering a Hierarchical Clustering Based Nonparametric Approach to Estimating Fragility for Real Ground Motions* **Zhuo Song** and Xiaojun Li Beijing University of Technology, China
XJ0050 17:00-17:15	*Building in Uncertain Time: Investigating New Normal Construction Risks Arising from the Military Coup* **Zin Bo Aung,** Wasaporn Techapeeraparnich, Nathee Athigakunagorn and Charinee Limsawasd Mahidol University, Thailand
XJ0061-A 17:15-17:30	*Integrated Assessment of Seismic Economic Impacts: An Interpretable Ensemble Machine Learning Approach* **Jinpeng Zhao** and Xiaojun Li Beijing University of Technology, China
XJ0024-A 17:30-17:45	*Recent Status and Directions for Outsourcing Construction Engineering Management Works* **Joseph J. Kim** and Vishwajit S. Desai California State University Long Beach, USA
XJ0018 17:45-18:00	*Explore Owner Organizational Capability in Thai Construction Industry* **Panorm Chanderm** and Piyanut Wethyavivorn Kasetsart University, Thailand

Poster Session

Urban Planning and Environmental Pollution Control	
14:00-18:00 (GMT+8) March 23, 2024 (Saturday)	Venue: Queen III, Level 2
XJ1002	*Summer Microclimate of Urban Built Environment Research* **Shouli Yi**, Di Hu, Yuanbo Tuo and Suping Gao Sichuan Normal University, China
XJ0020	*Generative Urban Design Methods Based on Interactive Web Application* Gang Liu, **Xinchen Jiang**, Meng Yang, Siyu Chen, Yi Liu China Southwest Architectural Design and Research Institute Corp.Ltd, China
XJ5016-A	*Inhibiting Acidithiobacillus Ferrooxidans through Microbial Production of Low-Molecular-Weight Organic Acids to Prevent Acid Mine Drainage Generation in High-Sulfur Coal Mines* **Wenbo Li** and Qiyan Feng China University of Mining and Technology, China
XJ1003	*Research on the Availability of Outdoor Space Under the Background of Aging* **Shouli Yi**, Di Hu, Guo Chen, Yuanbo Tuo and Suping Gao Sichuan Normal University, Chengdu, China
XJ5018-A	*Development of ZIF-67@3D Platform Electrode for Utilization of MOF as a Catalyst for Water Electrolysis* **YuJin Jo** and JongSung Park Gyeongsang National University, Republic of Korea
XJ5023-A	*Optimal Dispatch for Microgrid Energy Management System Based on Firefly Moving Regression Strategy* **Cheng-I Chen** National Central University, Taiwan
XJ0064-A	*Seismic Performance of Precast Double-column Pier with UHPC-filled Socket Connections* **Xiaolong Si** Beijing University of Technology, China
XJ5015-A	*Groundwater Pollution and Control Measures for Closed Coal Mines in China* **Qiyan Feng**, Xueqiang Zhu, Wenbo Li, and Xiangdong Li China University of Mining and Technology, China
XJ0011	*Numerical Study of Cold-formed Steel Built-up Compression Members for Long-span Structures* **Johnny Setiawan**, Ridho Bayuaji and M. Arif Rohman Institut Teknologi Sepuluh Nopember (ITS), Indonesia

Session 7

Building Materials, Building Environment, and Construction Management Chair: Assoc. Prof. Osama Mohammed Ahmed Daoud, university of Khartoum, Sudan	
13:30-16:15 (GMT+8) March 24, 2024 (Sunday)	Room ID: 890 8696 8540 https://us02web.zoom.us/j/89086968540
XJ0057 13:30-13:45	*Optimizing Soil Strength Through Rice Husk Ash Incor-poration: A Sustainable Geotechnical Solution* **Abdelmageed Atef** and Zakaria Hossain Mie University, Japan
XJ0062-A 13:45-14:00	*Fundamental Study on the Effect of Surfactants on Mechanical Properties of Water Sprinkling Cured Mortar* **Kosuke Oka,** Tsubasa Sato and Shigeuki Date Tokai University, Japan
XJ0043 14:00-14:15	*Artificial Neural Network Prediction of Total Construction Cost using Building Elements for Low to Mid-rise Buildings* **Abo Yasser Manalindo,** Dante L. Silva, Russell L. Diona and Kevin Lawrence M. de Jesus Mapua University, Philippines
XJ0025 14:15-14:30	*Identification of Green Construction Indicators and Project Performance in Green Construction Based Project Management using the Delphi Method* **I G A Istri Mas Pertiwi,** Yulvi Zaika, Kartika Puspa Negara, Solimun and M Agung Wibowo Brawijaya University, Indonesia
XJ0044 14:30-14:45	*Influence of Factors Affecting the Delay in Bridge Construction using Neural Network-Based Sensitivity Index Method* **Karlo Allen R. Pieldad,** Dante L. Silva, Russell L. Diona and Kevin Lawrence M. de Jesus Mapua University, Philippines
XJ1005 14:45-15:00	*Analysis of Karst Water System and Upper Reservoir Leakage of the Pumped-Storage Power Station in Jiangyou, China* **Chunwen Chen,** Xingcan Wei, Sijia Li and Nengfeng Wang Chengdu Engineering Corporation Limited, China
XJ1006 15:00-15:15	*Comparative Analysis of the Features of Major Green Building Rating Tools (GBRTs): a Systematic Review* **Francis O. Okeke,** Emmanuel C. Ezema, Eziyi O. Ibem, Chinwe Sam-amobi and Abdullahi Ahmed Canterbury Christ Church University, UK
XJ0067 15:15-15:30	*Selection Of Highway Underpass Accessibility Solution for Flooded Area Using Analytical Hierarchy Process Method* **Danang Atmodjo,** Slamet Imam Wahyudi, Henny Pratiwi Adi and R S Wahyudi Sultan Agung Islamic University, Indonesia
XJ1007 15:30-15:45	*Assessing the Impact of Building Plan Shapes on Natural Ventilation Efficiency for Thermal Comfort in Educational Facilities: a Post-occupancy Evaluation* Emeka J. Mba, **Francis O. Okeke**, Peter I. Oforji, Ikechukwu W. Ozigbo, Ezema C. Emmanuel and Chinelo A. Ozigbo Canterbury Christ Church University, UK

XJ1010 15:45-16:00	*Indicators to Check Global Optimality of Design Solution of Looped Water Distribution Networks* Rajesh Gupta, Laxmi Gangwani and **Shilpa Dongre** Visvesvaraya National Institute of Technology (VNIT), India
XJ5004-A 16:00-16:15	*Recycling of Waste Paper to Convert into Environmental Friendly Mosquito Replant Sticks Using Natural Azadirachtin* Vaibhav Sapkal, Pooja Kharra, **Kevin Somra,** Rahul Sharma and V. K. Dogra Shri Mata Vaishno Devi University (SMVDU), Katra (J&K), India

Session 8

Engineering Vibration and Mechanical Properties of Building Structures Chair: Prof. Pier Paolo Rossi, University of Catania, Italy	
16:30-18:30 (GMT+8) March 24, 2024 (Sunday)	**Room ID: 890 8696 8540 https://us02web.zoom.us/j/89086968540**
XJ0054 16:30-16:45	*Inspection, Appraisal, and Rehabilitation Plan for the Main Shaft Tower at a Gold Mine* **Sen Li** Shandong Business Institute, China
XJ0042 16:45-17:00	*Flexural Behavior of Indonesian Berua Timber: Experimental Test and Numerical Analysis* **Yosafat Aji Pranata,** Anang Kristianto and Novi Universitas Kristen Maranatha, Indonesia
XJ0005 17:00-17:15	*Research on Seismic Performance of Existing Skew Bridges Considering Performance Degradation of Laminated Bearings* WU Gang, **WANG Yiqin,** ZOU Youquan, WU Bitao, LIU Xuzheng and REN Liang East China Jiaotong University, China
XJ0026 17:15-17:30	*Theoretical Study on the Influence of Plate Position Parameters on the Compressive Bearing Capacity of Concrete Expanded Plate Double-Pile* **Chang Hanyuan,** Qian Yongmei, Zhai Lian and Zhang Ji yuan Jilin Jianzhu University, China
XJ0058 17:30-17:45	*Evaluation Equations of Global Stability for Single-layer Cylindrical Grid Shells Based on Parametric Analysis and Regression Analysis* **Baoxin LIU,** Pei-Shan CHEN, Yaozhi LUO, Hui-Bin GE and Yanbin SHEN Zhejiang University, China
XJ0041 17:45-18:00	*Shear Strength of Red Meranti (Shorea spp.) Timber at An Angle to The Grain* **Yosafat Aji Pranata**, Novi, Deni Setiawan, Vivi Arisandhy, Hendry Wong, Sof-hie Angela Hagiyanto Universitas Kristen Maranatha, Indonesia
XJ0035 18:00-18:15	*Detecting Debonding in FRP Retrofitted Concrete Beams using Nonlinear Ultrasonic Waves* **Reza Soleimanpour,** Mohammad Hany Yassin, Naser Khaled Mohammad, Mohammad Khaleel Bo Arki and Miryan Nabil Sweid Australian University, Kuwait
XJ0002 18:15-18:30	*Structural Behavior of Reinforced Concrete Spliced Beams Subjected to Repeated Loads: Experimental Study* Alaa Hassoon, **Haider M. Al-Jelawy,** Alaa Jaleel Naji and Dheyaa A. N. Alobaidi University of Al-Qadisiyah, Iraq

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Preface

The 2024 8th International Conference on Civil Engineering (ICOCE 2024) was successfully and physically held in Singapore during March 22–24, 2024. This event has provided a unique opportunity for international scholars, researchers and practitioners working in a wide variety of scientific areas with a common interest in civil engineering to interact and share knowledge.

This year, there were more than 40 participants in total. They were from China, Singapore, USA, Philippines, India, Thailand, Kuwait, UK, Japan, Korea, Indonesia, etc. The conference has included discussions on topics such as wastewater treatment and water quality analysis, renewable energy and electric motor technology, infrastructure engineering and hydraulic engineering, properties of building materials and structures, environmental pollution control and resource management, seismic response of engineering structures and construction management, building materials, building environment, and construction management, engineering vibration and mechanical properties of building structures. In addition, two excellent keynote speeches were delivered by Prof. Joseph Kim from California State University Long Beach, USA, and Assoc. Prof. Ong Ghim Ping Raymond from the National University of Singapore, Singapore. After that, Assoc. Prof. Kwun Nam Hui from University of Macau, China, Assoc. Prof. Chian Siau Chen, Darren from the National University of Singapore, Singapore, and Dr. Kim Yongmin from the University of Glasgow, Singapore, gave outstanding invited speeches. All the speeches and presentations focused on the latest information and most innovative developments in their respective expertise areas of civil engineering.

ICOCE 2024 has received more than 70 papers. Thirty-six papers were accepted for publication in the Conference Proceedings. All the submissions were peer reviewed by Conference Committees. The papers selected depended on their originality, language, quality, and their relevancy to the conference. The proceeding is divided into six chapters, including engineering vibration and mechanical properties of building structures, mechanical properties of concrete structures, hydraulic engineering and flood control, urban planning and infrastructure engineering, properties of building materials and structures, building environment and environmental impact assessment of buildings, engineering project management and optimization. We are

sure that the proceedings will serve as an important research tool to become a source of references and knowledge, which will lead to not only scientific and engineering findings but also to new products and technologies.

Finally, we would like to deeply express our heartfelt appreciation to all our delegates, keynote speakers, invited speakers, session chairs, and international reviewers as well as all the committee members involved in the technical evaluation of conference papers and in the conference organization for your enthusiasm, effort, and great contributions. Apart from that, we would like to extend our thanks to all the authors and external reviewers for your willingness to make the conference a worthwhile experience. It is your recognized competence, enthusiasm, valuable time, and expertise that have enabled us to prepare and hold the conference and make it a great success.

Dimondale, USA Prof. Eric Strauss

Contents

Shear Strength of Red Meranti (*Shorea Spp.*) Timber at an Angle to the Grain

Yosafat Aji Pranata, Novi, Deni Setiawan, Vivi Arisandhy, Hendry Wong, and Sofhie Angela Hagiyanto

Abstract The shear strength is one of the parameters that is used for the design of beam members in wood buildings. Shear strength is also used as a parameter for bridge girder design. Red meranti (*Shorea spp.*) is a species that is easily found in Indonesia and is commonly used as a construction material for buildings, docks, or bridges. The objective of this study is to obtain an empirical equation for the shear strength with different grain angles from 0° to 10°. The research of the influence of the grain angle must be carried out under real conditions, since the direction of the wood grain is not perfectly 0° and the inclination of the grain can influence the shear strength of the wood. The method of making the specimens and the experimental methods refer to ASTM D143-22, and the total number of test specimens was 33 specimens. The tests were performed using a universal testing machine, with the test speed (crosshead) 0.6 mm/minute. The test results show that the shear strength of wood with a directional fiber angle ranging from 0° to 10° in a range from 2.77 MPa (10° grain angle) to 7.57 MPa (0° grain angle). The results of the analysis by the polynomial regression method give an empirical equation, namely $F_v = 7.03 - 0.97\theta + 0.066\theta^2$ with R-Sq = 74.7%. Fiber angle has an effect on shear strength. Empirical equations offer advantages to building designers in calculating the design capacity of wood beams, especially due to shear forces.

Keywords Shear strength · Red Meranti (*shorea spp.*) · Timber · Angle

1 Introduction

The shear strength is a fundamental mechanical property of timber and is used in general timber structural design such as beam of column members. The shear strength can be determined by clear specimen testing as recommended by testing standards such as ASTM D143-22 [1]. This paper has presented the outline results of a series of shear tests to determine the shear strength of Red Meranti (*Shorea spp.*) timber at

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an angle to the grain. The shear test procedure has been to produce shear strengths based on ASTM D143-22 [1]. It was noticed that the cracks were commonly initiated within clear timber and caused shear failure. As the grain angle increasing from zero to certain value, the mechanical properties will be decreased. The greatest influence of grain deviation angle on mechanical properties was recorded for ultimate load values.

Several previous researches of wood shear testing to obtain mechanical properties of shear strength, among others, were carried out by He et al. [2] which is studying shear testing of spruce and Douglas-fir woods to obtain shear strength parameters and their influence on the main axis of the wood, namely in the tangential–longitudinal plane and in the radial–longitudinal plane directions, and the shape of the test object and the test method refers to the ASTM D143, with the aim of obtaining shear strength parameters and failure modes. Other research has also been done by Teixeira et al. [3], namely studying the shear strength of Angelim-pedra wood with an orientation parallel to the grain, and then, another research with the Red Meranti wood type was carried out by Rizki [4], namely studying the shear strength parallel to the grain (0° grain angle). In 2011, the author himself [5] also carried out experimental research to obtain shear strength parameters parallel to the grain of Red Meranti wood with a grain angle of 0°. The grain angle is a deviation of fibers from a line parallel to an edge of sawn wood [6]. Variability in timber mechanical properties can be mainly attributed to the grain angle, beside the wood density, of course. Grain deviation from the directions of the forces causes a decrease in mechanical properties of timber [7–9]. A strength reduction due to the increase in the grain deviation angle was also observed in the shear strength property, and the grain deviation angle from 0 to 30° causes a decrease in shear strength by about 30 to 45% [10, 11] and reaching even about 70% [12].

The objective of this study is to obtain an empirical equation for the shear strength with different grain angles from 0° to 10°. The research of the influence of the grain angle must be carried out under real conditions, since the direction of the wood grain is not perfectly 0° and the inclination of the grain can influence the shear strength of the wood. The method of making the test specimens and the test methods refer to ASTM D143-22 [1], and the total number of test specimens was 33 specimens. The tests were performed using a universal testing machine, with the test speed or crosshead is 0.6 mm/minute. The significance of the research works is to obtain the empirical values of the shear strength at an angle to the grain ranged from 0° to 10°.

2 Basic Theory

2.1 Shear Strength Mechanical Properties

The shear strength is an important parameter for the design of beam members in wood buildings. Shear strength is also used as a parameter for bridge girder design. Red meranti (*Shorea spp.*) is a species that is easily found in Indonesia and is commonly used as a construction material for buildings, docks, or bridges. The objective of this study is to obtain an empirical equation for the shear strength with different grain angles from 0° to 10°. The research of the influence of the grain angle must be carried out under real conditions, since the direction of the wood grain is not perfectly 0° and the inclination of the grain can influence the shear strength of the wood.

2.2 Clear Specimen Tests

The shear specimen test shall be made on a 50 mm by 50 mm by 63 mm specimens notched in accordance with Fig. 1 to produce failure on a 50 mm by 50 mm surface. The load applied to and support the specimen on end-grain surfaces. The shear tool shall include an adjustable crossbar to align the specimen and support the back surface at the base plate [1]. The shear load for calculation of the shear strength is the maximum or ultimate load that causes the failure of specimen in term of shear plane 50 mm by 50 mm. The tests were performed using a universal testing machine, with the test speed (crosshead) 0.6 mm/minute.

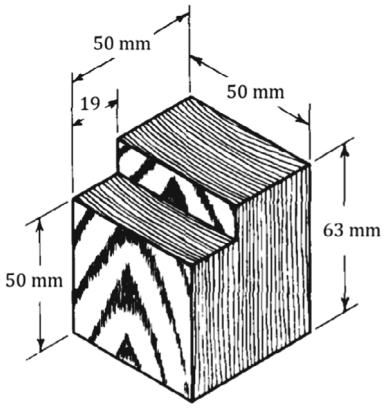

Fig. 1 Specimen for shear tests [1]

2.3 Hankinson's Formula

Elastic theory can be used to obtain the mechanical properties in directions other than along the parallel and perpendicular grain angle. Mechanical properties of wood which area elastic modulus, tensile strength, compression strength, and many more in directions ranging from parallel to perpendicular to the grain can be calculated using a Hankinson formula [9].

$$N = \frac{P \cdot Q}{P \cdot \sin'' \theta + Q \cdot \cos'' \theta} \tag{1}$$

where N is strength at angle θ from grain angle, Q is strength perpendicular to the grain, P is strength parallel to the grain, and n is an constant [9].

2.4 Polynomial Regression Method

Polynomial regression is a regression model that is formed by adding up the influence of each independent variable raised to increasing powers up to the $n - 1$ order. The highest power of the independent variable determines the shape of the response curve. The polynomial model can be used to find out that there is a linear curve influence on the response, and its shape resembles a curve. The polynomial model is also useful as an approximation function for very complex models and nonlinear relationships [13].

3 Experimental Test and Results

3.1 Experimental Test

Shear test specimens were made from raw timber logs, which have been visually sorted to obtain defect-free parts. The number of test objects in this study was 33 test objects with grain angle variations ranging from 0° to 10°. The method of making the test specimens and the test methods refer to ASTM D143-22 [1]. Figure 2 shows some of the test object that has been made. Figure 3 shows the wood shear testing process.

Fig. 2 Specimen for shear tests

Fig. 3 Shear tests

3.2 Results

Figure 4 shows several examples of test results, namely the failure modes of the specimens after destructive testing to obtain the ultimate load which resulted in failure in the shear plane. Figure 5 shows the test results, namely the load versus deformation relationship curve for each test object with a grain angle direction of 0° to 10°. Table 1 and Fig. 6 show the results of calculating the shear strength of wood at various angles of the grain angle. To calculate the shear strength, parameter of cross-section of shear area (Fig. 1) is calculated using real shear area of each specimen.

The test results in Table 1, namely the parameters of the shear strength of wood and the direction of the grain angle, are then processed further using quadratic-type polynomial regression analysis to obtain predictions of the empirical equation for the shear strength of wood. The analysis is carried out using Minitab software [14]. The

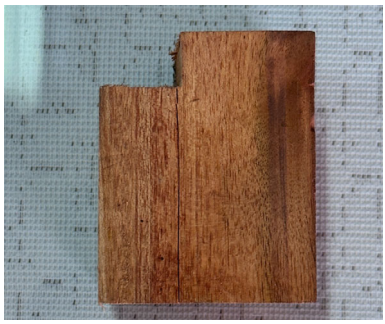

Fig. 4 Shear test result specimen with grain angle 0°

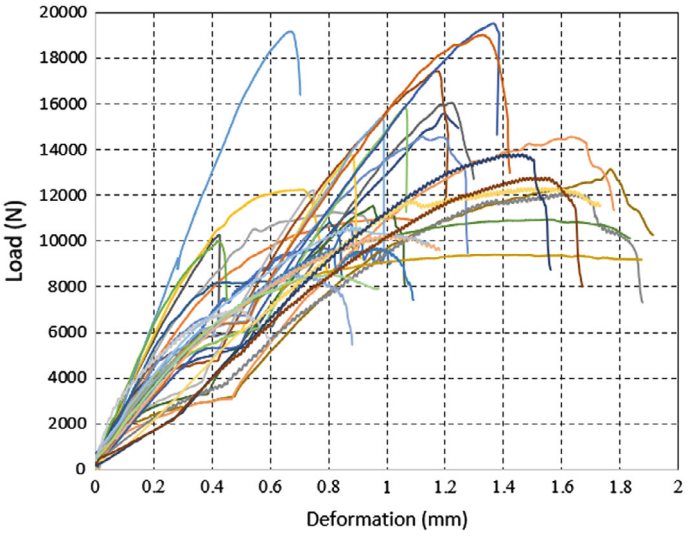

Fig. 5 Load versus deformation results obtained from experimental tests

analysis results (Fig. 6) show that the experimental test results, namely the ultimate load versus deformation curve, have a tendency for the ultimate load to decrease as the direction of the wood grain angle increases. This indicates that the shear strength of wood has the highest value at the grain angle parallel to the direction of the wood grain (grain angle 0°).

Results obtained from study which is equation to predict the shear strength at an angle to the grain shown in Eq. 2.

$$F_v = 7.03 - 0.97\theta + 0.066\theta^2 \tag{2}$$

$$\text{R-Sq} = 74.7\% \tag{3}$$

Table 1 Shear load (peak) obtained from experimental tests

Specimen	Specimen	Area (mm^2)	P_U (N)	F_v (MPa)	D_{max} (mm)	θ
K3.20	K.1	2525.55	17,431.86	6.90	1.18	0
K3.50	K.2	2533.78	19,018.69	7.51	1.33	0
K3.1	K.3	2531.77	19,172.62	7.57	0.67	0
K3.37	K.4	2539.30	14,563.99	5.74	1.13	1
K3.38	K.5	2549.24	14,559.46	5.71	1.63	1
K3.45	K.6	2533.27	15,401.46	6.08	0.98	1
K3.47	K.7	2526.74	15,813.41	6.26	1.06	1
K3.49	K.8	2530.23	17,521.24	6.92	1.37	1
K2.32	K.9	2499.49	11,261.84	4.51	0.82	2
K2.34	K.10	2492.99	12,239.55	4.91	0.71	2
K3.6	K.11	2521.18	13,491.15	5.35	0.43	2
K3.17	K.12	2517.53	15,578.01	6.19	1.20	2
K3.25	K.13	2517.02	16,044.29	6.37	1.22	2
K3.34	K.14	2534.78	11,515.32	4.54	0.95	2
K3.40	K.15	2534.12	12,225.97	4.82	0.75	2
K3.44	K.16	2536.80	13,758.22	5.42	0.88	2
K4.7	K.17	2523.70	12,133.17	4.81	1.62	2
K3.32	K.18	2526.74	13,135.80	5.20	1.77	3
K3.33	K.19	2520.20	10,813.73	4.29	0.81	3
K4.33	K.20	2516.51	10,929.15	4.34	1.57	3
K5.4	K.21	2517.20	10,245.69	4.07	0.98	3
K5.13	K.22	2533.75	12,327.81	4.87	1.52	3
K5.44	K.23	2520.20	13,796.70	5.47	1.42	3
K5.32	K.24	2543.69	10,585.16	4.16	0.89	4
K5.38	K.25	2533.72	8536.98	3.37	0.81	4
K1.32	K.26	2522.21	10,261.53	4.07	0.43	5
K2.28	K.27	2515.18	11,021.94	4.38	1.01	5
K4.22	K.28	2536.80	9400.73	3.71	1.38	5
K4.27	K.29	2528.58	9690.99	3.83	0.95	5
K5.45	K.30	2528.24	12,769.15	5.05	1.54	6
K5.12	K.31	2531.42	7018.90	2.77	0.50	7
K2.2	K.32	2503.94	10,748.10	4.29	0.88	8
K5.1	K.33	2538.13	8623.11	3.40	0.67	10

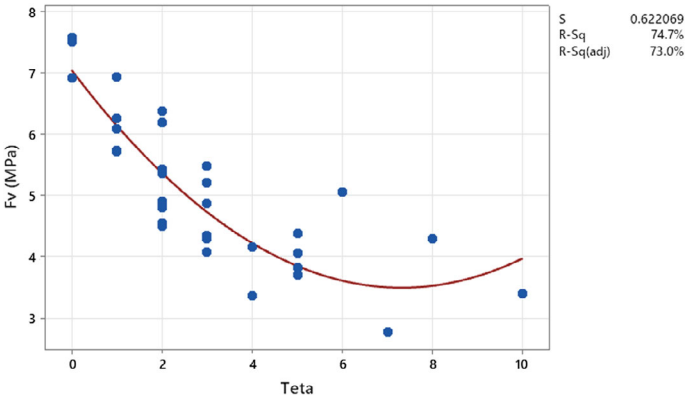

Fig. 6 Results obtained from study: equation to predict the shear strength at an angle to the grain

4 Conclusion

The test results show the shear strength of wood with a directional fiber angle ranging from 0° to 10° in a range from 2.77 MPa (10° grain angle) to 7.57 MPa (0° grain angle). The results of the analysis by the polynomial regression method give an empirical equation, namely $F_v = 7.03 - 0.97\theta + 0.066\theta^2$ with R-Sq = 74.7%. Fiber angle has an effect on shear strength. Empirical equations offer advantages to building designers in calculating the design capacity of wood beams, especially due to shear forces.

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