2006 International Symposium on Antennas and Propagation

• November 1 – 4, 2006 • Orchard Hotel, Singapore

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Published by

Research Publishing Services
H12F Double Tank Colony, K.K. Nagar, Chennai 600 078, India
e-mail: enquiries@researchpubonline.com

Singapore office: #3 Kerbau Road, Singapore 219159

2006 International Symposium on Antennas and Propagation
Program & Abstracts of

ISBN 81-90310-8-3 (cd-rom)

Design & Typeset by Research Publishing Services, India
E-mail:enquiries@researchpubonline.com
Printed in Singapore

Sponsored and Organized by

Singapore Section of the Institute of Electronics,
Information and Communication Engineers (IEICE)

Co-sponsored by

The Communication Society of the Institute of Electronics,
Information and Communication Engineers (IEICE)

Technically Supported by

National University of Singapore

The Antennas and Propagation Society of the
Institute of Electrical and Electronics Engineers (IEEE/AP-S)

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Institue for Infocomm Research (I^2R)

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Welcome Message by General Co-Chairs

The 2006 International Symposium on Antennas and Propagation (ISAP2006) to be held at Orchard Hotel, in Singapore on November 1–4, 2006, is the 11th ISAP in its series, organized and sponsored by the ***IEICE Singapore Section***. This symposium is co-sponsored by *the Communications Society of the Institute of Electronics, Information and Communication Engineers* (IEICE). *This symposium is held under the technical co-sponsorship of the National University of Singapore, the Antennas and Propagation Society (AP-S) of the Institute of Electrical and Electronics Engineers* (IEEE), *the Nanyang Technological University, and the Microwave Theory and Techniques Society (MTT-S) of the IEEE, and is held in co-operation with the NUS Centre for Microwave and RF* (CMRF), *the Institute of Engineers, Singapore* (IES), *the Antennas and Propagation Professional Network of the Institute of Electrical Engineers* (IEE), *the International Union of Radio Science* (URSI), *the Chinese Institute of Electronics* (CIE), and *the Korea Electromagnetic Engineering Society* (KESS).

Since its inception, the International Symposia on Antennas and Propagation (ISAP) were always held in Japan. On August 3 to 5 in 2005, the ISAP series migrated outside of Japan onto Seoul, Korea, for the first time in its history. The 2005 International Symposium on Antennas and Propagation (ISAP2005) was held at the Seouls KyoYuk MunHwa HoeKwan organized by the Korea Electromagnetic Engineering Society. This year, ISAP2006 is sponsored and organized by the IEICE Singapore Section in Singapore, for the second time outside of Japan in its history. The ISAP series provides an international forum for exchanging information, reporting latest results and sharing new ideas on research and development in antennas, propagation, electromagnetic wave theory, systems, and related areas.

Singapore is a dynamic city in the Asia Pacific regime, having a fine reputation as a clean Garden City as well as one of the safest and most livable metropolitan in the world. November of 2006 falls in the rainy season (versus the dry season) in Singapore; and the weather in this season is most comfortable with temperature ranging from 22°C to 28°C. The symposium venue is located in one of the most fashionable district in Singapore and there are many things to do after an exhilarating day at the symposium. You can stroll along the Orchard Shopping Street as well as the Marina Square and China Town areas and enjoy the nice sunshine outdoor; or alternatively, you could also enjoy the wonderful shopping time along the Orchard Road.

We look forward to seeing you at the ISAP'06 in Singapore on November 1–4, 2006.

Professor Le-Wei Li
General Co-Chair
ISAP'06
National University of Singapore

Professor Tat-Soon Yeo
General Co-Chair
ISAP'06
National University of Singapore

Welcome Message by Technical Program Committee Co-Chairs

On behalf of the Technical Program Committee (TPC) for the 2006 International Symposium on Antenna & Propagation (ISAP2006), we would like to express our sincerest gratitude to the session organizers, technical reviewers, session chairs and other volunteers. Without their hard work and great effort in promoting ISAP2006, ensuring the quality of the papers and helping with the general administration, this conference would not have been a success.

We are honoured to welcome three renowned experts in prominent areas who will share the most recent advances in their respective fields keynote addresses. The TPC also planned a number of invited papers from recognized experts to showcase the most recent progress in their research. These talks will be delivered at the start of a few selected technical sessions.

The technical sessions of ISAP2006 have been split into five parallel tracks. The technical sessions cover main topics in both the antenna and propagation areas. We received 336 submissions from 24 countries and after reviewing them, we accepted 318 papers for presentation. The TPC is pleased with the quality of the submissions, and we trust that you will find the selected papers interesting and informative. We also look forward to some exciting discussions and novel idea exchanges during ISAP2006.

In addition to an exciting technical program, ISAP2006 provides an opportunity to catch up with old friends and to make new ones. We appreciate your active participation and involvement in ISAP2006, and trust that you will find the time spent with us in Singapore both rewarding and enjoyable.

Professor Jacob Carl Coetzee
Technical Program Committee Co-Chair
ISAP'06
National University of Singapore

Dr. Zhi Ning Chen
Technical Program Committee Co-Chair
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Performance Electroma
and Low Ripple

Herawati Ys[1], Eko Cipto[2]
[1] *Department of Electrical E*
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[2] *Department of Electrical E*
[3] *Department of Electrical E*

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Base station of WLAN system. The antenna is analyzed by CST (Microwave studio) program. A prototype antenna operating at 2.45 GHz. with an impedance bandwidth (2:1 VSWR) of 37.62% from measured result (about 2.105–3.000 GHz). The proposed antenna is unidirectional radiation pattern with front-to-back ratio (F/B) of greater than 20 dB in H-plane and E-plane radiation patterns. Maximum gain is about 9 dBi from measured result. The half-power beamwidth (3dB) is about 58.8 degree in E-plane and 65.0 degree in H-plane. The cross polarization greater than 20 dB has been obtained.

Performance Electromagnetic Bandgap in Core E Type Make High Frequency and Low Ripple

Herawati Ys[1], Eko Cipto[2] and Iwa Garniwa[3]

[1] *Department of Electrical Engineering, University of Christian Maranatha. E-mail:Siti_herawati_aminah@yahoo.com*
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[3] *Department of Electrical Engineering, University of Indonesia. E-mail:iwa@ee.ui.ac.id*

The Bandgap will make the system better than without use it and makes the efficiency bigger than before but it must be fixed with in the system need it. When the system doesn't fix will be influence with the duty cycle and bandgap, therefore obtained is output ripple current losses less than 10 percents.

If the system has the fix bandgap then its must calculate about the magnetomotans in the system, where the magnetomotans is one of the sources of the electromagnetic field. The big ripple must take from the trouble system. Then reduce the trouble system with the model system with the new one but don't change the size of the parameter before its.

Like as inductance, and etc. So the magnetomotans build the electromagnetic field and then joint to electromagnetic field in the bandgap has. The core of the magnetomotans are made from ferrite, the ferrite can make electromagnetic field. The parameter can be find any electromagnetic field in the system. The number of magnetomotans must created 2, 4, 6, and so on, as a function of the controlling system, and can make it more than one conductor, the conductor made from copper and make it the stranded coil with 50 degrees. For that reason so can be calculate parameter like the high impedance surface forms much parameters to the one thing about electromagnetic bandgap. In this paper the core E type model with six bandgaps. Take the trouble system with the Cuk converter.

In this paper for initial condition without use bandgap core type the efficiency about 4.3%, while the system use the bandgap will be 96% with the ring wire gauge about $r = 4.10^{-4}$ m, if we change the ring wire gauge about $r = 8.10^{-4}$ m, and the initial condition with no use bandgap core type is result of the efficiency about 7%, so the system use the bandgap can be reach 98%.

If the inductance from the system Cuk converter about L = 8.2 μ H, before modification, it found the ripple current more than 3%, then after the system was modify with for two inductance, with L1 = L2 = 4.4 μH can find the output ripple current as follows; before modify is 1.2% and After modification of the total output ripple current become 0.036%.

Analysis of 2D Via-less Artificial Magnetic Conductors Using a Cavity Model

Yading Li and Karu P. Esselle

Center for Electromagnetic and Antenna Engineering, Electronic Department, Macquarie University, Sydney NSW 2109, Australia. E-mail:liyd@ics.mq.edu.au, esselle@ics.mq.edu.au

A rigorous full-wave cavity model is developed for 2D vialess (i.e. uni-planar) metallic periodic structures, which may or may not have a PEC ground plane. This model considers all the homogeneous material blocks in these structures as coupled electromagnetic cavities. This coupled cavity problem is then solved using magnetic vector potential. The via-less artificial magnetic conductor (AMC) surfaces are analyzed using this cavity model and the wave reflection coefficients are calculated for normal incidence case. The results show good agreement with the full-wave HFSS simulation results. To confirm the accuracy of this method, we also compare the electric fields calculated using the cavity model and HFSS.

A Fast FMM-PSTD Method

Yijing Fan, Ooi Ban Leong and Leong Mook Seng

Department of Electrical and Computer Engineering, National University of Singapore, Kent Ridge, Singapore, 119260

Recently, Chebyshev PSTD has become a flexible and efficient approach in EM transient analysis. The major computation cost for PSTD method comes from the evaluation of differentiation matrix multiplication. In order to further improve the efficiency, the fast multipole algorithm is exploited. The fast multopole algorithm is a basic hierarchical method which is first developed in celestial mechanics. Recently it has been employed to analysis cardinal series in computational physics. Make use of the similarity of N-body problem and Chebyshev interpolation, a new fast multipole accelerated PSTD method is developed in this paper.

Performance Electromagnetic Bandgap in Core E Type Make High Frequency and Low Ripple

Herawati Ys[1], Eko Cipto [2], Iwa Garniwa[3] .

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Abstract

The Bandgap will make the system better than without use it and makes the efficiency bigger than before but it must be fixed with in the system need it. When the system doesn't fix will be influence with the duty cycle and bandgap, therefore obtained is output ripple current losses less than 10 percents.

If the system has the fix bandgap then its must calculate about the magnetomotans in the system, where the magnetomotans is one of the sources of the electromagnetic field. The big ripple must take from the trouble system. Then reduce the trouble system with the model system with the new one but don't change the size of the parameter before its.

Like as inductance, and etc. So the magnetomotans build the electromagnetic field and then joint to electromagnetic field in the bandgap has. The core of the magnetomotans are made from ferrite, the ferrite can make electromagnetic field. The parameter can be find any electromagnetic field in the system. The number of magnetomotans must created 2, 4, 6, and so on, as a function of the controlling system, and can make it more than one conductor, the conductor made from copper and make it the stranded coil with 50 degrees. For that reason so can be calculate parameter like the high impedance surface forms much parameters to the one thing about electromagnetic bandgap. In this paper the core E type model with six bandgaps. Take the trouble system with the Cuk converter.

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If the inductance from the system Cuk converter about L = 8.2 .H, before modification, it found the ripple current more than 3%, then after the system was modify with for two inductance, with $L_1 = L_2 = 4.4$ .H can find the output ripple current as follows; before modify is 1.2% and After modification of the total output ripple current become 0.036%.

Index Terms – Bandgap, ferrite, core E type, low ripple high efficiency.

I. INTRODUCTION

UTPUT Ripple Current of prototype can generate noise of result produce for example at chemical process, current ripple permitted to minimize 2%. From research of current ripple can be minimized to become 0.036% [3] to minimizing of output current ripple can be improved to become 0% according to system [1] Winding of conductor can be stranded, so that yield high frequency, where this high frequency wired for ripple current output system become zero.

With approximation of magnetic circuit from result of modification [3], where magnet network use the core of ferrite can have the character of lumped [2] & [5]. bandgap as generating of magnet flux [2], in the reality interpose air can be utilized as a controller of input tension and of output [3] and even technology which used many in antenna and propagation can control system [7], operation of this system very determined by surface impedance, where surface impedance, studying bandgap, bandgap awaken dielectric [4] big size of dielectric determine operation of high frequency [6].

II. BANDGAP IN CORE E TYPE

Under consideration this paper, performance from 6 bandgaps, taken core of core E type, bandgap in core E type make dielectric bigger, be same with wired [4] which the modifier later

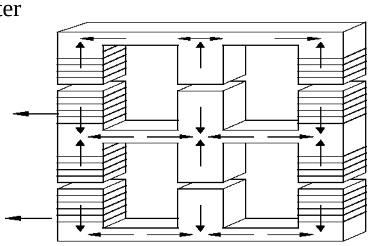

Fig.1. Core E Type with 6 bandgaps

From figure 1 core E type with 6 bandgap reckoned is big planned Cuk converter in this case taken by boost converter with input 9 volts [3] so that bandgap of each foot given 1 mm, with calculation of parameter in table 1. From the core can be reckoned by approach of magnetic materials to electrics network [3] by reckoning value of reluctance eq. 1, capacitance and permeans [3]

$$\Re = \frac{l}{\mu Ac} \qquad (1)$$

After reckoned by figure 1 hence its rewrite at table 1.

TABLE I

VALUE OF RELUCTANCEI AND PERMEANS FROM TYPE CORE

	Long Race (cm)	Large (cm^2)	Reluctance (AT/Wb)	Permeans (H)
Left Foot Core I_1	1	0.18	$0.442\ 10^6$	$2.262\ 10^{-6}$
Part II_1 Core	0.6	0.18	$0.265\ 10^6$	$3.773\ 10^{-6}$
Middle Foot core III_1	1	0.36	$0.221\ 10^6$	$4.524\ 10^{-6}$
Part IV_1 Core	0.6	0.18	$0.265\ 10^6$	$3.773\ 10^{-6}$
Right Foot Core V_1	1	0.18	$0.442\ 10^6$	$2.262\ 10^{-6}$

From fig.1. Reckoned by all parameter value there by reckoned also for foot [2] and [3]. With equation 1 reckoned also reluctance 6 bandgaps so that if taken by example of calculation of bandgaps for first feet hence table of like table II. Later changing reckoned by all gaps of take bandgaps start 0.1 until 0.6 mm.

TABLE II

ASSESS RELUCTANCE AND PERMEANS OF 6 BANDGAP.

$Bandgap_1$ (mm)	Large (Cm^2)	Reluctance (AT/Wb)	Permeans (H)
0.1	0.18	$0.00442\ 10^9$	$226.244\ 10^{-9}$
0.2	0.18	$0.00884\ 10^9$	$113\ 10^{-9}$
0.3	0.18	$0.0132\ 10^9$	$75.75\ 10^{-9}$
0.5	0.18	$0.0221\ 10^9$	$45.24\ 10^{-9}$
0.6	0.18	$0.0265\ 10^9$	$37.73\ 10^{-9}$

Later changing reckoned is big inductance of circuit Cuk converter in this case taken by L as according to inductance have problem, end then we replaced with the all parameter materials:

Writer take materials for winding made of copper materials,and the core E type we take from the ferrite with the following parameter as follows:

- Length primary side coil winding stranded of metal of l_1= 3 m
- Length primary side coil winding stranded of metal of primary side winding strand of metal of l_2= 3 m
- Length primary side coil winding stranded of metal from secondary l_3= 3 m
- Length primary side coil winding stranded of metal on secondary l_4= 3 m
- Radius of core E type in side primary stranded of metal radius of r1= r2= radius of core E type for in side stranded of metal radius of secondary r3= r4, is differentiated to become eq. 3 :
  - r1= r2= r3= r4= 4.10^{-4} m
  - r1= r2= r3= r4= 8.10^{-4} m
  - r1= r2= r3= r4= 16.10^{-4} m
- Effective input Primary length endwise stranded of metal of l_{1e}= input endwise stranded of metal effective length of secondary l_{2e}= 2.7 m, is obtained from :
  l_e = cos β(/ 2), where β= 50^0
  l_{1e}= 3 cos (50^0/ 2) = 3 x 0.9 = 2.7 m
- Type copper prisoner ρ= 1.72 10^{-8} ohm/m
- Permeability of air μ0= 4π. 10^{-7} Weber/amp
- frequency f = 25 KHz
- Conductivity copper σ= 5.8 107 Ω/m

Parameter above been adapted for by duty cycle with voltage regulation times like equation [2] and [3], in this case the high frequencies we find from design of bandgaps.

$$t_1 = \frac{\Delta I_1 L_1}{V_s} \qquad (2)$$

$$T = \frac{1}{f} = t_1 + t_2 = \frac{\Delta I_1 L_1}{V_s} - \frac{\Delta I_1 L_1}{V_s - V_{c1}} = \frac{\Delta I_1 L_1 V_{c1}}{V_s(V_s - V_{c1})} \qquad (3)$$

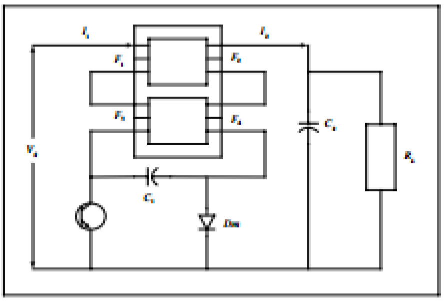

Fig.2. Modify Cuk converter with core E type six bandgaps

When all parameter, have been reckoned hence simulation through Psimval with the model like fig. 5. and fig. 6.

III. MAGNETOMOTANS [2, 5]

The winding evaluated as element two do or two

connective polar tide approach of electrics network and magnetic network

$$\lambda = N\Phi \quad (4)$$

$$i = \frac{F}{N} \quad (5)$$

V and of I represent electrics field interaction and magnetic field which seen by fig.4. Polar electrics network four with parameter of hybrid [3] as the following equation 6:

$I_1 = g_{11}V_1 + g_{12}V_2$

$I_2 = g_{21}V_1 + g_{22}V_2$ (6)

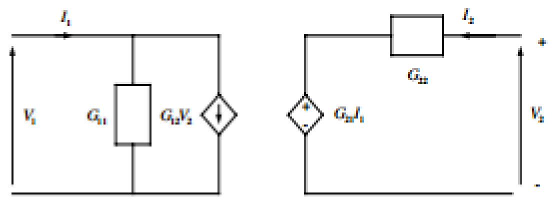

Fig.3. Electric circuit four ports

On fig.4. electric circuit four ports as direction of the reference for electric parameter of circuit magnetic made from ferrite where was calculated in table 1. as:

$V_1 = r \cdot i_2$

Or

$V_2 = r \cdot i_1$ (7)

Or with voltage control current source (VCCS).

$I_1 = g \cdot V_2$

Or

$I_2 = g \cdot V_1$ (8)

The modification of equation with implementation as:

$$g = \frac{1}{R} \quad (9)$$

While all parameter was calculate as a function of simulation

parameter in Psimval. The ripple out is eq.10 :

$$\Delta I_2 = \frac{-V_a\,(1-k)}{f\,L_2} = \frac{k\,V_s}{f\,L_2} \quad (10)$$

$$H = \frac{1}{g} \quad (11)$$

The closer primer side of core coil transformer bandgap as fig.1. The gyrator circuit.

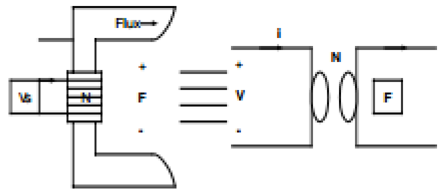

Fig.4. the Gyrator model transformation primary side of gyrator-capacitors

The modeling gyrator of primer side as the model Gyrator side of secondary:

Length primary side coil winding stranded of metal

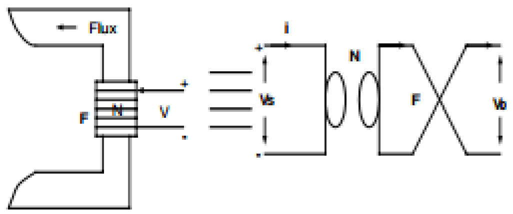

Fig.5. Gyrator model side of secondary transformation interposes air.

IV. ANALYSIS

Of bandgaps, 0.1 mm, 0.2 mm until 0.6 mm, taken by conductor parameter of core E type, coil winding of stranded with angle, corner of trended 50 degree, is later than reckoned by resistant value of gyrator, more bigger of resistant of Gyrator and hybrid so the result of the load is more smoothly or no ripple. And the time of steady state for that condition more quickly stable, is progressively disappear at magnet which smaller resistant.

The resistance of gyrator from the total approaching capacitance material ferrite and bandgap, at from RGat table 1 and 2 , we find RG = 0.2 Ohm, and then we simulated it so ripple out put about 2% with full load condition the ripple from eq.10. the ripple is 2.% for the initial condition with bandgap about 0.2 mm.

$$\Delta l = \frac{(82.598 - 80.938)x\,10^{-3}}{82.598\,x\,10^{-3}}\,x\,100\% = 2\%$$

While the bandgap about 0.4 mm, the resistant of Gyrator more smaller about 0.0128 Ohm. For the full load as figure .8. RG = 0.0128 Ohm, its find the out put ripple 1.6%, to be the same with fig.9, we find the gyrator resistance about 0.098 ohm but the ripple bigger than before.

We find the total gyrator resistance with any variable , the best of total gyrator resistance must be appropriate with material, bandgap, and coil winding. Obtained of the ripple can be zero according appropriate all.

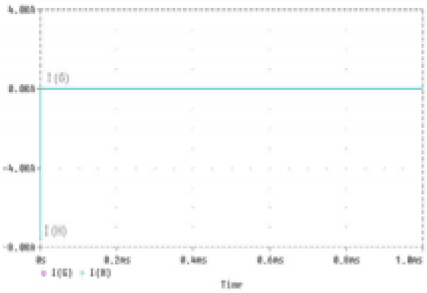

Fig.6. Graphic Current of Gyrator IGand Current of Hybrid IH to Time for RG = 0.0128 Ohm

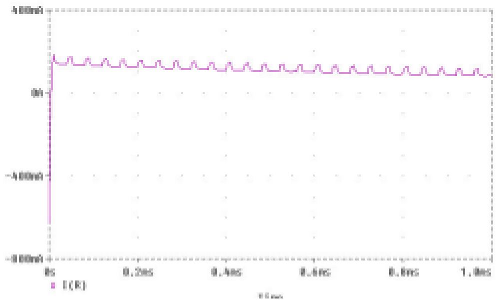

Fig.7. Graph load Current, for Time RG = 0. 0128 Ohm

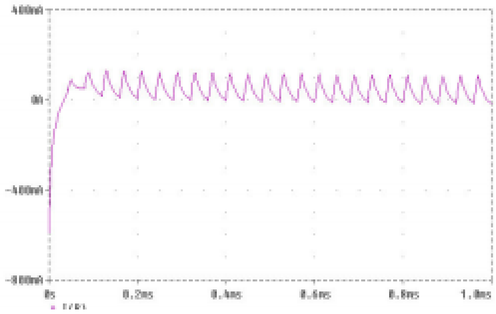

Fig.8. Graph load current with Time for RG = 0.098 Ohm.

Of this parameter can be seen by output current ripple we can see there is still ripple, because not yet been encumbered in an optimal fashion, from model fig. 7, searched by encumbering characteristic for the prisoner of gyrator include parameter of high impedance. After calculate the winding which stranded hence smaller ripple and more stable like fig. 8. Obtained efficiency about 98%.

V. CONCLUSION

With giving bandgap equal to 1 mm to six gaps hence output by using tables 1 hence model of ferrite E core type given by coil winding equal to $r = 4.10^{-4}$ m, at condition of stranded of metal before we make stranded obtained the output current ripples equal to 1.8%, after stranded become 1.6%. If we take the different radius $r = 8.10^{-4}$ m, at condition of endwise strand of metal before stranded obtained by current ripples equal to 1.6%, after stranded become 1.4%. If we take r = 16.10-4m, at condition of stranded strand of metal before stranded obtained by current ripples equal to 1.4%, and after the stranded ripple become 1.2%.

Total resistant gyrator from 0.4 mm bandgap, have high frequency 25 KHz total efficiency of E type of material ferrite become 98%, with the total output ripple current is 0.036%.

The total resistant Gyrator depends on the load.

VI. REFERENCE

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