PIERS 2018 Toyama

Progress In Electromagnetics Research Symposium

Program

August 1 - 4, 2018
Toyama, JAPAN

www.emacademy.org
www.piers.org

15:20 Dispersion Characteristic of Elliptical Waveguide under New Boundary Condition
Shamini Pillay Narayanasamy Pillay (*Multimedia University*); *Deepak Kumar* (*Multimedia University*);

15:40 **Coffee Break**

Session 3P4b
SC1: Computational Techniques in Electromagnetics and Applications

Friday PM, August 3, 2018

Room T4

Organized by Yoichi Okuno, Tsuneki Yamasaki

Chaired by Yoichi Okuno, Tsuneki Yamasaki

16:00 Numerical Analysis of a Leapfrog ADI-FDTD Method for Metamaterial Maxwell's Equations
Meng Chen (*Xiangtan University*); *Yunqing Huang* (*Xiangtan University*); *Jichun Li* (*University of Nevada, Las Vegas*);

16:20 A Grating-based Plasmon Index Sensor: Possibility of Workspaces with Tractable Minimal TM Efficiencies
Xun Xu (*Kyushu Sangyo University*); *Miaoning Zheng* (*South China Normal University*); *Yoichi Okuno* (*South China Normal University*);

16:40 Analysis of Inter-Bundle Crosstalk in High Speed MIMO Signalling in Powerline Communication Channels
Modisa Mosalaosi (*University of KwaZulu-Natal*); *Thomas Joachim Odhiambo Afullo* (*University of KwaZulu-Natal (UKZN)*);

17:00 Numerical Analysis of Pulse Reflection Response from Conducting Strips in Dispersion Media with Air Layer
Ryosuke Ozaki (*Nihon University*); *Tsuneki Yamasaki* (*Nihon University*);

17:20 Scattering of Electromagnetic Wave by a Rectangular Cylinder Consist of Conducting Strips
Tsuneki Yamasaki (*Nihon University*); *Toshiki Shibayama* (*Nihon University*); *Ryousuke Ozaki* (*Nihon University*);

Session 3P5
SC4: Advanced Antenna and RF Circuits Design

Friday PM, August 3, 2018

Room T5

Organized by Malay Ranjan Tripathy, Yongchae Jeong

Chaired by Malay Ranjan Tripathy, Yongchae Jeong

13:00 Effect of Mutual Coupling within Elements of Array-units Beyond Full Wavelength Element Spacing for Linear Arrays
Jacob Adopley (*Ghana Technology University College*);

13:20 Design of a Size-reduced Microwave Amplifiers Using an Asymmetrical Spiral-DGS
Jongsik Lim (*Soonchunhyang University*); *Phanam Pech* (*Chonbuk National University*); *Heeyoun Choi* (*Chonbuk National University*); *Yongchae Jeong* (*Chonbuk National University*); *Sang-Min Han* (*Soonchunhyang University*); *Dal Ahn* (*Soonchunhyang University*);

13:40 $\lambda/2$ Stepped Impedance Resonator Parallel/Antiparallel Coupled-line Bandpass Filter with a Wide Stopband Characteristic
Phirun Kim (*Chonbuk National University*); *Phanam Pech* (*Chonbuk National University*); *Girdhari Chaudhary* (*Chonbuk National University*); *Jongsik Lim* (*Soonchunhyang University*); *Malay Ranjan Tripathy* (*Amity University Uttar Pradesh*); *Yongchae Jeong* (*Chonbuk National University*);

14:00 Flexible Printed Active Antenna for Digital Television Reception
Teerapong Pratumsiri (*Chulalongkorn University*); *Panuwat Janpugdee* (*Chulalongkorn University*);

14:20 Reliability Ranking of Nodes: A Case of Revolution
Priya Ranjan (*Amity University Uttar Pradesh*); *Harshit Pandey* (*Amity University Uttar Pradesh*); *Malay Ranjan Tripathy* (*Amity University Uttar Pradesh*); *Cher-Ming Tan* (*Chang Gung University*); *Saumay Pushp* (*KAIST*);

14:40 A Compact Slotted 4 Element Large Wideband MIMO Antenna for Wireless Application
Bishal Mishra (*Amity University Uttar Pradesh*); *Rehan Ahmed Siddiqui* (*Amity University Uttar Pradesh*); *Malay Ranjan Tripathy* (*Amity University Uttar Pradesh*); *Daniel Ronnow* (*University of Gavle*);

Design of a Size-reduced Microwave Amplifiers Using an Asymmetrical Spiral-DGS

Jongsik Lim[1], **Phanam Pech**[2], **Heeyoun Choi**[1], **Yongchae Jeong**[2], **Sang-Min Han**[1], **and Dal Ahn**[1]

[1]Soonchunhyang University, Republic of Korea
[2]Chonbuk National University, Republic of Korea

Abstract— It has been known that any periodic structure or perturbation inserted in transmission lines plays a role to reduce circuit sizes due to the equivalent components. One of well-known structures is defected ground structure (DGS), and spiral-shaped DGS patterns have been proposed previously. In this work, a dumbbell-shaped asymmetric spiral DGS, Fig. 1(a), is adopted for the known advantages of DGS. In Fig. 1(b), two resonant frequencies exist due to the asymmetrical pattern of DGS although only one DGS pattern is included. It seems that two different and separate DGS patterns show their corresponding resonant frequencies independently. If the proposed asymmetrical spiral DGS pattern is inserted in the matching networks of an amplifier, which has been designed normally and named as "basic amp" as in Fig. 2(a), the size of the amplifier can be reduced as illustrated in Fig. 2(b). The physical lengths "$L1$" and "$L2$" in matching networks are shorter than "$L1$"' and "$L2$"', respectively, while the electrical lengths "$\theta 1$" and "$\theta 2$" are almost the same as "$\theta 1$"' and "$\theta 2$"'. Therefore the reduced amplifier in Fig. 2(b) has the smaller size than "basic amp". It is important for the original performances of the "basic amp" to be preserved even after the size-reduction. Fig. 3(a) presents the measured S-parameters of the "basic amp" of which gain is around 15 dB over $2.0 \sim 2.5$ GHz. In addition, Fig. 3(b) shows the measured performances of the size-reduced amplifier. Even though there are some minor discrepancies, a very good agreement between two S-parameters sets is observed. This means the size-reduction of the amplifier using the proposed asymmetrical spiral-DGS has no negative effect of the performances of the original amplifier. It is understood that there is no critical damage in the S-parameters of the spiral DGS at the operating frequency of the "basic amp". Summarily, it is expected to reduce the size of microwave circuits successfully by inserting spiral DGS without a critical cost of performances.

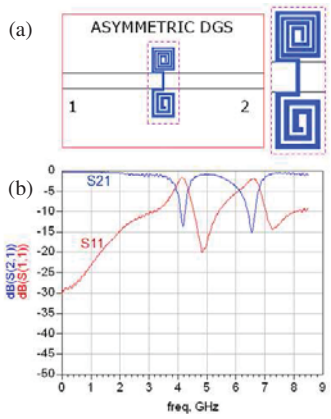

Figure 1.

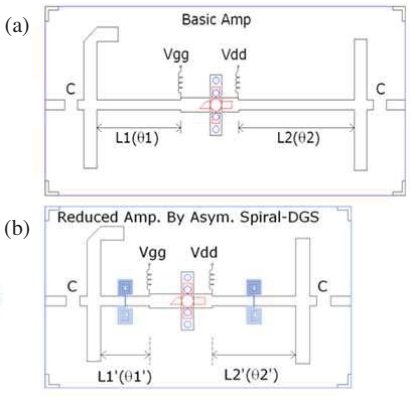

Figure 2.

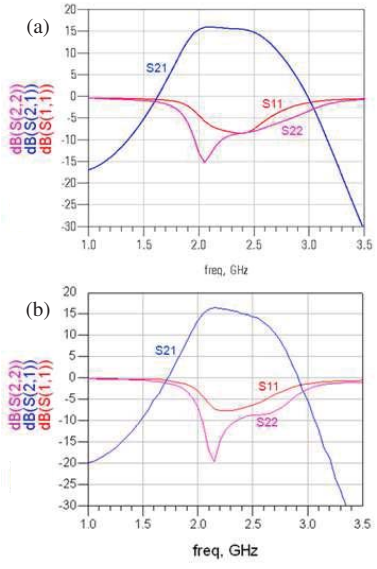

Figure 3.