PIERS 2018 Toyama

Progress In Electromagnetics Research Symposium

Program

August 1 - 4, 2018
Toyama, JAPAN

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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 $\boldsymbol{\lambda}/2$ 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*);

15:00 An X-band 16-element Switched-beam Antenna Array with Butler Matrix Network
Chao-Hsiung Chang (*National Taiwan University of Science and Technology*); *Jheng-Yuan Huang* (*National Taiwan University of Science and Technology*); *Chun-Hao Tseng* (*National Taiwan University of Science and Technology*);

15:20 Wideband Flat Group Delay Circuit for Self-interference Cancellation in Full Duplex
Girdhari Chaudhary (*Chonbuk National University*); *Qi Wang* (*Chonbuk National University*); *Malay Ranjan Tripathy* (*Amity University Uttar Pradesh*); *Yongchae Jeong* (*Chonbuk National University*);

15:40 **Coffee Break**

16:00 Slot-coupled Circularly Polarized SIW Antenna Array for 5G Apllication
Rehan Ahmed Siddiqui (*Amity University Uttar Pradesh*); *Bishal Mishra* (*Amity University Uttar Pradesh*); *Malay Ranjan Tripathy* (*Amity University Uttar Pradesh*); *M. S. Prasad* (*Amity University Uttar Pradesh*);

16:20 A Novel 1–6 GHz Chaotic Signal Oscillator for Broadband Communication Systems
Shanwen Hu (*Nanjing University of Posts and Telecommunications*); *Shu Yu* (*Nanjing University of Posts and Telecommunications*); *Yunqing Hu* (*Nanjing University of Posts and Telecommunications*); *Zixuan Wang* (*Nanjing University of Posts and Telecommunications*); *Bo Zhou* (*Nanjing University of Posts and Telecommunications*);

16:40 A Novel UWB Quadrifilar Plannar Spiral Antenna
Hesham M. Elkady (*Higher Institute of Engineering and Technology in New Damietta*); *Haythem Hussein Abdullah* (*Electronics Research Institute (ERI)*); *Saad M. Darwish* (*Alexandria University*);

17:00 Design of a Ring Oscillator with Temperature and Process Compensation Adopting a Novel Method
Jian-Chang Du (*Southeast University*); *Zhigong Wang* (*Southeast University*); *Xi Chen* (*Southeast University*); *Jian Xu* (*Southeast University*); *Bing-Bing Ma* (*Southeast University*);

17:20 Miniaturized Wilkinson Power Divider with DC Isolation
Sichen Xie (*Sophia University*); *Hitoshi Hayashi* (*Sophia University*);

17:40 A Wideband Circularly Polarized Dipole Antenna with Crossed Configuration
Min-Cheol Hong (*Hoseo University*); *Ju-Heun Lee* (*Hoseo University*); *Jeong-Taek Oh* (*Hoseo University*); *Sang-Min Han* (*Soonchunhyang University*); *Won-Sang Yoon* (*Hoseo University*);

18:00 T-shaped Slot Loaded Rectangular Patch Antenna with Enhanced Bandwidth Using Defected Ground Structure
Nagendra Prasad Yadav (*Nanjing University of Science and Technology*); *Malay Ranjan Tripathy* (*Amity University Uttar Pradesh*); *Yongchae Jeong* (*Chonbuk National University*);

18:20 Vertical Polarized 1-D Series-fed $\mathbf{1 \times 2}$ Linear Array for X-band Synthetic Aperture Radar Applications
Venkata Kishore Kothapudi (*Vellore Institute of Technology (VIT)*); *Vijay Kumar* (*Vellore Institute of Technology (VIT)*); *Lakshman Pappula* (*Koneru Lakshmaiah Education Foundation*); *Balveer Painam* (*Koneru Lakshmaiah Education Foundation*);

Session 3P6a
SC1: Radar Cross Section and Inverse Problems in Electromagnetics

Friday PM, August 3, 2018

Room T6

Organized by Yury Vladimirovich Yukhanov, Yury V. Shestopalov

Chaired by Yury Vladimirovich Yukhanov, Yury V. Shestopalov

13:00 Optimization Method in 2D DC Cloaking Problems
Gennady V. Alekseev (*Institute of Applied Mathematics FEB RAS*); *Dmitry A. Tereshko* (*Institute of Applied Mathematics FEB RAS*); *Elizaveta O. Paklina* (*Far Eastern Federal University*);

13:20 Broadband RCS Reduction Using Digital Impedance Metasurfaces with 2-bit Coding of Axes of Anisotropy and Eigen Reactances
Andrey I. Semenikhin (*Southern Federal University*); *Diana V. Semenikhina* (*Southern Federal University*); *Yury Vladimirovich Yukhanov* (*Southern Federal University*); *P. V. Blagovisnyy* (*Southern Federal University*);

13:40 Synthesis of a Two-focal Impedance Reflector of Arbitrary Shape
Yury Vladimirovich Yukhanov (*Southern Federal University*); *Tatyana Yurievna Privalova* (*Southern Federal University*); *Timur O. Amirokov* (*Southern Federal University*); *E. E. Privalov* (*Southern Federal University*);

Wideband Flat Group Delay Circuit for Self-interference Cancellation in Full Duplex

Girdhari Chaudhary[1], **Wang Qi**[1], **Malay Ranjan Tripathy**[2], **and Yongchae Jeong**[1]

[1]Division of Electronics and Information Engineering, Chonbuk National University, Republic of Korea
[2]Amity University, Uttar Pradesh, India

Abstract— The in-band full duplex (IBFD) has the potential for doubling network capacity and data throughput by allowing efficient utilization of frequency spectrum. However, the fundamental challenge for implementing IBFD systems is how to reduce its inherent high self-interference that is caused due to transmission and reception of a signal at same frequency [1]. The precise group delay (GD), amplitude, and phase matchings are critical for signal cancellation IBFD radio. Various techniques have investigated to cancel the self-interference in IBFD by extracting some amount of signal from transmitter path and combining it at receiver path with destructive interference, where the most important thing is to match GD, amplitude, and phase of leakage (main) and extracted (reference) paths at receiver node for achieving high self-interference cancellation. The conventional RF self-interference cancellation circuits have achieved cancellation over narrow bandwidth (such as 20 MHz cancellation bandwidth). Therefore, one of challenging issues for wideband self-interference cancellation is to match GDs of reference and main paths over a wide bandwidth, which necessitates design and implementation of wideband GD circuits. The various types of reflection-type GD circuits have been explored in planar microstrip technology, however, these configurations have limited flat GD bandwidth (flat GD fractional bandwidth $< 2\%$) and high insertion loss [2–4].

This work presents an analytical design technique of wideband GD circuit with arbitrary prescribed flat GD. The proposed GD circuit consists of 3-dB hybrid coupler where coupled and through ports are terminated with shortcircuited coupled lines. The closed-form analytical design expressions are provided to calculate the circuit parameters for arbitrarily prescribed flat GD response, which do not require any transformative procedures to obtain the circuit parameters for the specified flat GD response.

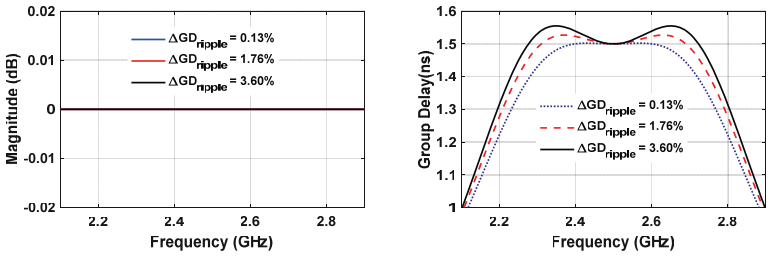

Figure 1: The synthesized response of the proposed wideband group delay circuit.

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REFERENCES

1. Hong, S., J. Brand, J. Choi, M. Jain, J. Mehlman, S. Katti, and P. Levis, "Application of self-interference cancellation in 5G and beyond," *IEEE Communication Magazine*, Vol. 52, No. 2, 114–121, Feb. 2014.
2. Lucyszyn, S. and I. D. Robertson, "Analog reflection topology building blocks for adaptive microwave signal processing applications," *IEEE Trans. Microwave Theory Tech.*, Vol. 43, No. 3, 601–611, Mar. 1995.