

PIERS 2019 Rome

Photonics & Electromagnetics Research Symposium

also known as Progress In Electromagnetics Research Symposium

Program

June 17 - 20, 2019

Rome, ITALY

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18:00 Solar Activity Influence on the Mesopause Temperature and F2 Peak Electron Density
Irina Medvedeva (Institute of Solar-Terrestrial Physics); Konstantin G. Ratovsky (Institute of Solar-Terrestrial Physics, SB RAS);

Session 4P2

Electromagnetic Methods and Electronic Devices for Security

Thursday PM, June 20, 2019

Room 5 - 1st Floor

Organized by Lorenzo Capineri

Chaired by Pierluigi Falorni, Daniela Deiana

14:30 Background Removal for the Processing of Scans Acquired with the “UGO-1st” Landmine Detection Platform

Lorenzo Capineri (Università di Firenze); Pierluigi Falorni (Università di Firenze); G. Borgioli (Università degli Studi di Firenze); Luca Bossi (Università di Firenze); Gennadiy Pochanin (O. Ya. Usikov Institute for Radiophysics and Electronics of the National Academy of Sciences of Ukraine); V. Ruban (O. Ya. Usikov Institute for Radiophysics and Electronics of the NAS of Ukraine); O. Pochanin (O. Ya. Usikov Institute for Radiophysics and Electronics of the NAS of Ukraine); T. Ogurtsova (O. Ya. Usikov Institute for Radiophysics and Electronics of the NAS of Ukraine); Fronefield Crawford (Franklin & Marshall College); Timothy D. Bechtel (Franklin & Marshall College);

14:50 Development of Multifrequency MW Detection Device to Scan Liquids in Security Checkpoints

M. Vafadar Yengejeh (Gebze Technical University); Sultonazar Mamadazizov (Gebze Technical University); B. Colak (Alanya Alaaddin Keykubat University); Bulat Rameev (Gebze Technical University);

15:10 Multi-sensor Fusion Applied to the Detection of Person-Borne Improvised Explosive Devices (PB-IEDs)

Daniela Deiana (Electronic Defence, TNO Defence, Safety and Security); Patrick Hanckmann (Intelligent Autonomous Systems, TNO Defence, Safety and Security);

15:30 Electromagnetic Induction Imaging with Atomic Magnetometers: Surveillance and Security Applications

Cameron Deans (University College London); Luca Marmugi (University College London); Ferruccio Renzoni (University College London);

15:50 Design of Small Sized SFCW Radar for Landmine Detection

D. Sipos (University of Maribor); Dusan Gleich (University of Maribor);

16:10 Smart Radar Sensors for Critical Sites Protection

Simone Ledda (University of Florence); Guido Biffi Gentili (University of Florence);

16:30 **Coffee Break**

17:00 Magnetic Resonance and Microwave Techniques for Security Applications

Bulat Rameev (Gebze Technical University);

17:20 Remote Sensing for the Detection of Explosives and Energetic Materials by ¹⁴N NQR and ¹⁴N NMR

Georgy Mozhukhin (Gebze Technical University); A. Marasli (Gebze Technical University); S. Mamadazizov (Gebze Technical University); B. Colak (Alanya Alaaddin Keykubat University); Bulat Rameev (Gebze Technical University);

17:40 Compressed Sensing Stepped Frequency Ground Penetrating Radar Using Structure

Venceslav Kafedziski (University Ss Cyril and Methodius);

18:00 Some Opinion and Estimation about Possibility to See Stealth by Microwave Radiometer

Hao Liu (Harbin Institute of Technology); Chao Wu (Harbin Institute of Technology); Dajing Wang (Harbin Institute of Technology); Jing-Hui Qiu (Harbin Institute of Technology); Oleksandr Denisov (Harbin Institute of Technology);

Session 4P3a

Transmission Line, Waveguide & Filter

Thursday PM, June 20, 2019

Room 7 - 1st Floor

Chaired by Shinichi Tanaka, **Yongchae Jeong**

14:30 Development of Inkjet-printed Microwave Filters for 1–6 GHz Band Communications Applications

Hüseyin Sinan Aksimsek (Istanbul Kultur University); E. A. Ozek (Istanbul Kultur University);

14:50 A Compact Harmonic Filter Using CRLH Transmission Line Stubs for Class-E Power Amplifiers

H. Asami (Shibaura Institute of Technology); Shinichi Tanaka (Shibaura Institute of Technology);

- 15:10 **CMOS Microwave Bandpass Filter Using High Q Active Inductor**
Qi Wang (Chonbuk National University); *Phirun Kim* (Chonbuk National University); *Girdhari Chaudhary* (Chonbuk National University); *Jongsik Lim* (Soonchunhyang University); *Yongchae Jeong* (Chonbuk National University);
- 15:30 Compact Wide-stopband Quarter-mode SIW Bandpass Filter with Triangle Cavity
Phirun Kim (Chonbuk National University); *Phanam Pech* (Chonbuk National University); *Jongsik Lim* (Soonchunhyang University); *Dal Ahn* (Soonchunhyang University); *Yongchae Jeong* (Chonbuk National University);
- 15:50 Transmission Lines Modeling Approach Based on the Approximation of Pade
Zahra Bouzidi (Cadi Ayyad University); *Abdelaziz El Idrissi* (Cadi Ayyad University); *Hicham Roujiaa* (Hassan University 1); *Mohamed Saih* (University of Sultan Moulay Slimane);
- 16:10 Measurement of Parameters of Objects in Non-standard Guiding Systems and in Free Space
Vladimir Ivanovich Evseev (LLC "Arzamas Instrument-making Design Bureau"); *Oleg Veniaminovich Lavrichev* (JSC "Arsamassky Pri-borostroitelny Zavod imeni Plandina"); *Elena Alexandrovna Lupanova* (Nizhniy Novgorod State Technical University n.a. R. E. Alekseev); *Sergey Michailovich Nikulin* (Alekseev's Nizhny Novgorod State Technical University);
- 16:30 **Coffee Break**
- 17:00 Comparative Study of Multipactor Effect in Rectangular and Parallel-plate Waveguides Partially Loaded with Dielectric
A. Berenguer (Universidad Miguel Hernandez de Elche); *Angela Coves Soler* (Universidad Miguel Hernandez de Elche); *E. Bronchalo* (Universidad Miguel Hernandez de Elche);
- 17:20 A CMOS Single Stage Sub-harmonic Mixer with Two Conversion Modes for Fast Spectrum Sensing Functionality
Seongjin Bae (Chonbuk National University); *Donggu Im* (Chonbuk National University);
- 17:40 Wideband Phase Shifter Using 3 Types of LC Resonant Circuits for Phase Slope Alignment
Youna Jang (Soonchunhyang University); *Maaz Salman* (Soonchunhyang University); *Yongchae Jeong* (Chonbuk National University); *Kwansun Choi* (Soonchunhyang University); *Sang-Min Han* (Soonchunhyang University); *Dal Ahn* (Soonchunhyang University);
- 18:00 A High-efficiency DC-to-RF/RF-to-DC Conversion Module with Zero-threshold FET for Bidirectional Wireless Power Transfer
Takaharu Kume (The University of Electro-Communications); *Ryo Ishikawa* (The University of Electro-Communications); *Kazuhiko Honjo* (The University of Electro-Communications);
- 18:20 Bandwidth Broadening of a Waveguide Circulator for Industrial Dual-band Magnetrons
Kaviya Aranganadin (Hanyang University); *Hua-Yi Hsu* (National Taipei University of Technology); *Ming-Chieh Lin* (Hanyang University);
- 18:40 Modeling a Gyrotron Mode Converter Using 3-D CFDTD Simulation
Ming-Chieh Lin (Hanyang University); *Jianbo Jin* (Forschungszentrum Karlsruhe); *Stefan Illy* (Karlsruhe Institute of Technology (KIT)); *Konstantinos A. Avramidis* (Karlsruhe Institute of Technology (KIT)); *Manfred Thumm* (Karlsruhe Institute of Technology); *John Jelonnek* (Institute for Pulsed Power and Microwave Technology, Karlsruhe Institute of Technology);

Session 4P3b
Microwave and Millimeter Wave Circuits and Devices 2

Thursday PM, June 20, 2019

Room 7 - 1st Floor
 Chaired by Yongchae Jeong, Shinichi Tanaka

Session 4P4
Computational Electromagnetics, Hybrid Methods

Thursday PM, June 20, 2019

Room 8 - 1st Floor
 Chaired by Vladimir Okhmatovski, Mikhail Sergeevich Mikhailov

CMOS Microwave Bandpass Filter Using High Q Active Inductor

Q. Wang¹, P. Kim¹, G. Chaudhary¹, J. Lim², and Y. Jeong¹

¹Chonbuk National University, Republic of Korea

²Soonchunhyang University, Republic of Korea

Abstract— Microwave CMOS bandpass filter (BPF) has been proposed. The proposed BPF consists of MIM (metal-insulator-metal) and high Q active inductors (AIs) using feedback parallel resonator and cascode common gate structure (M3) as Fig. 1 shows. In the previous works, many CMOS BPFs were researched and developed. However, they had relatively low Q-factors and low operating frequencies due to the passive spiral inductors and capacitors. The proposed BPF can improve these drawbacks by using high-Q AI. The center frequency of the designed BPF is 5.25 GHz and it has a wide bandwidth around 200 MHz for IEEE 802.11a band of WLAN applications. The proposed BPF is simulated with 65 nm Samsung RF CMOS technology, which demonstrates an insertion loss smaller than 2.2 dB and return loss higher than 15.85 dB as Fig. 3 shows. The fabricated circuit occupies $500 \mu\text{m} \times 600 \mu\text{m}$ chip size and has good passband and return loss characteristics. The proposed circuit consumes 7.2 mW DC power at 1.2 V supply voltage, which is promising for the application of microwave circuit systems.

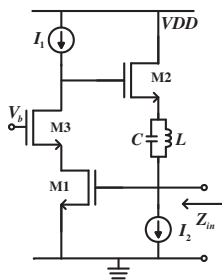


Figure 1.

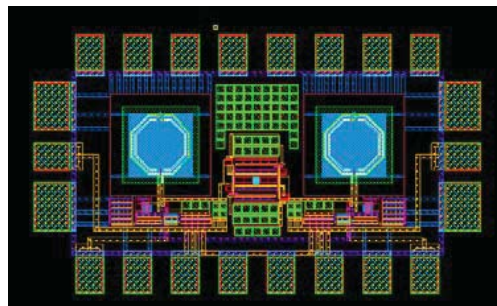


Figure 2.

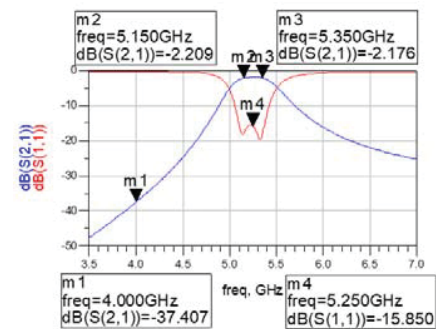


Figure 3.

REFERENCES

1. Zolfaghari, A., A. Chan, and B. Razavi, "Stacked inductors and transformers in CMOS technology," *IEEE Journal of Solid-State Circuit*, Vol. 36, No. 4, 620–628, Apr. 2001.
2. Seo, S., N. Ryu, H. Choi, and Y. Jeong, "Novel high-Q inductor using active inductor structure and feedback parallel resonance circuit," *Proceedings of IEEE Radio Frequency Integrated Circuits Symposium*, 467–470, 2007.