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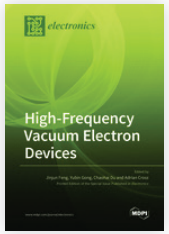
Special issue books



High-Frequency Vacuum Electron Devices

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Section Information:

Analog, digital, mixed, radio frequency (RF), resonant, radiation tolerant, low power, in vivo and other integrated electronic topics are now expanding in the microelectronics market due to increasing global demand. This Section on Microelectronics is dedicated to publishing original research articles and cutting-edge reviews for the applications of microelectronics in emerging, frontier and challenging technologies. Electronics operating in extreme environments, such as vacuum, space, harsh radiation, extreme cold and other niche applications, is today pushing microelectronic design beyond the frontier of standard electronics.

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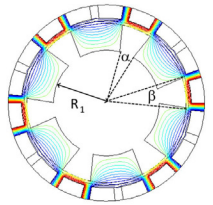
Selected Papers

DOI: 10.3390/electronics11233877

CNN-Based Surrogate Models of the Electrostatic Field for a MEMS Motor: A Bi-Objective Optimal Shape Design

Authors: Paolo Di Barba, Maria Evelina Mognaschi and Slawomir Wiak

Abstract: The use of a convolutional neural network to develop a surrogate model of the electric field in MEMS devices is proposed. An electrostatic micromotor is considered as the case study. In particular, different CNNs are trained for the prediction of the torque profile and the maximum torque value at a no-load condition and the radial force which could arise in case of the radial displacement of the rotor during motion. The proposed deep learning approach is able to predict the abovementioned quantities with a low error and, in particular, it allows for a decrease in the computational cost, especially in case of optimization problems based on FE models.



DOI: 10.3390/electronics11223708

Next-Generation Hybrid RF Front-End with MoS^2-FET Supply Management Circuit, CNT-FET Amplifiers, and Graphene Thin-Film Antennas

Authors: Paolo Crippa, Giorgio Biagetti, Lorenzo Minelli, Claudio Turchetti, Martino Aldrigo, Mircea Dragoman, Davide Mencarelli and Luca Pierantoni

Abstract: One-dimensional (1D) and two-dimensional (2D) materials represent the emerging technologies for transistor electronics in view of their attractive electrical (high power gain, high cut-off frequency, low power dissipation) and mechanical properties. This work investigates the integration of carbon-nanotube-based field-effect transistors (CNT-FETs) and molybdenum disulphide (MoS2)-based FETs with standard CMOS technology for designing a simple analog system integrating a power switching circuit for the supply management of a 10 GHz transmitting/receiving (T/R) module that embeds a low-noise amplifier (LNA) and a high-power amplifier (HPA), both of which loaded by nanocrystalline graphene (NCG)-based patch antennas. Verilog-A models, tuned to the technology that will be used to manufacture the FETs, were implemented to perform electrical simulations of the MoS2 and CNT devices using a commercial integrated circuit software simulator. The obtained simulation results prove the potential of hybrid CNT-MoS2-FET circuits as building blocks for next-generation integrated circuits for radio frequency (RF) applications, such as radars or IoT systems.