



# 2006 China-Japan Joint Microwave Conference Proceedings

August 23-25  
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晓看红湿处  
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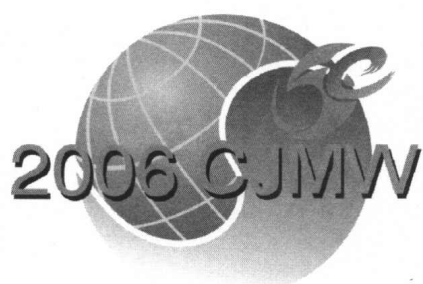


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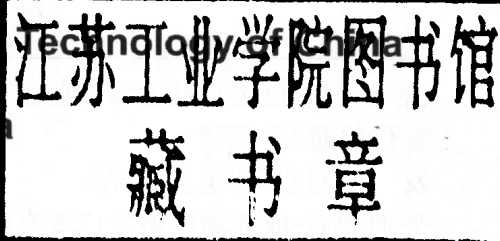
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# New Developments in Space Mapping CAD Technology

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*Abstract*—We review the state of the art in space mapping (SM) and the SM-based surrogate (modeling) concepts. We describe the input, implicit and output SM techniques. We present an SM framework and its applications in engineering modeling and design optimization. Significant examples of recent implementations of SM are reviewed.

# Simulation of Electromagnetic Propagation through Nanowire Using the FDTD Techniques

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*Abstract*—Silicon nanowires are presently attracting the great attention as they could be the promising candidates to realize the nano-sized optical waveguides, which can be extensively used for nano-scale integrated circuit as interconnects, multicolor nano-scale lighting emitting diodes, nano-sized optical sensors, such as molecular-scale sensor used for biological sensing. The electromagnetic propagation along the waveguides is usually limited by length depending on the ohmic losses, radiation damping and the radiative emission of the waveguides. However, the measurements of propagation length in experiment are very difficult. One of the promising approaches is to numerically predict the propagation characteristics. In this presentation, we shall use the finite-difference time-domain(FDTD) technique to predict the electromagnetic propagation on the nanowire.

# Spiral (Chiral) Interconnects and Their Applications in RF(MM)ICs

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*Abstract*—It is well known that spiral inductors have been widely used in radio frequency and microwave integrated circuits (RF(MM)ICs). As one of the key devices, inductors usually affect the overall performance of a RF circuit such as voltage-controlled oscillator (VCO), low noise amplifiers (LNA), and impedance matching, etc. On the other hand, spiral transformers and baluns have been also used in the development of various functional blocks in RFICs. Geometrically, spiral inductors, transformers, and baluns can be considered as three-dimensional “Chiral” or “helical” interconnects, which are physically represent the energy coupling systems.

In this presentation, various spiral or “chiral” interconnects are summarized and investigated experimentally, based on different advanced CMOS fabrication technologies. The author will present the solutions to some key problems with respect to the application of these chiral or helical configurations: (1) how to effectively enhance performance parameters of CMOS silicon-based spiral inductors and transformers; (2) how to suppress possible temperature effects on the performance degradation of these devices; and (3) how to effectively reduce overall loss of these devices so as to improve their high frequency performance. Some novel differential multi-spiral inductors and their implemented in the design of new VCOs, as an example, will be also shown and discussed.

# Proceedings of CJMW2006

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*Lei Xia, Ruimin Xu, Bo Yan(China)*

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