Faculty of Electrical Engineering & Computer Science
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HOCHSCHULE BREMEN
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Farid Omidhaghi

Development of an Electrostatically Actuated MEMS Switch for Frequency Selective Surfaces

ABSTRACT - Masterthesis

The greatest pledge of micro-electro-mechanical systems (MEMS) is the ability to yield mechanical motion on a very small scale. Due to their small amount of inertia, such devices consume typically low power and are fast. Nowadays MEMS-based sensors are widely deployed and commercialized. MEMS technology also shows potential applications in optics, robotics, biotechnologies, medical engineering, etc.

The explosive growth of data traffic such as internet, results in high capacity communication networks. Satellites and radio frequency systems are important components used in communication networks. The revelation of RF MEMS technology has attached the attention of the microwave industry which is interested in small and effective wireless applications. MEMS based RF systems may have a great role in making wireless products more efficient. By means of MEMS based RF components, the size of RF circuits can be greatly reduced by integrating all the off-chip components such as self-inductors and capacitors into on-chip packages. Simultaneously, the performance can also be improved by reducing nonlinearity effects and signal delay time and noise over on-chip components.

These excellent advantages and encouraging applications of MEMS based RF components is a motivation force for many telecommunication systems engineers. MEMS designers have to face the limitations of access to fabrication foundries. The cost of taking advantages of specialized clean rooms is too high. So the trial and error methods are not reasonable. MEMS designers have to model their MEMS design before the design is submitted to fabrication. MEMS designers should understand and anticipate their designs' behaviour as much as possible by modelling. Appropriate modelling of MEMS devices can conduct designers' efforts from device level designing to system level designing.

In this thesis, my effort is directed at these motivations: accurately design of the desired RF application by means of MEMS components and excellent modelling and simulation of designed system and components in order to fabricate a prototype, cost and time efficiently.