Master Thesis

Höchstfrequenz elektronik

RWTH AACHEN UNIVERSITY

mm-Wave Devices Modeling & Circuit Design

Background

Due to the increasing need of faster and more broadband communication, the operation in the mm-Wave and sub mm-Wave band is a good solution to provide high data rates in the range of tens of Gbits/s. Furthermore, it enables compact frontend designs, which can be integrated on a single chip.

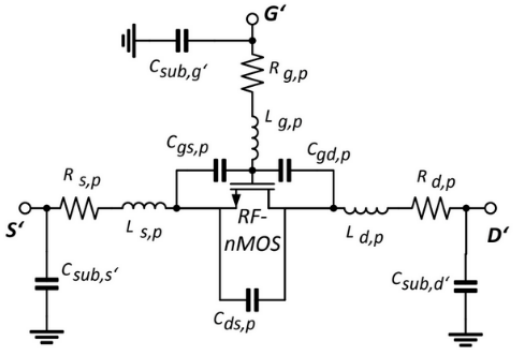
Even though state-of-the-art CMOS technologies can still provide amplification far beyond 100 GHz, there is a lack of accurate models for this frequency range in the available Design Kits (PDKs).

With the latest equipment upgrade at the Chair of High Frequency Electronics, it is possible to perform device characterization and modeling up to several hundreds of GHz. This enables a technology application close to its maximum oscillation frequency, f_{max}.

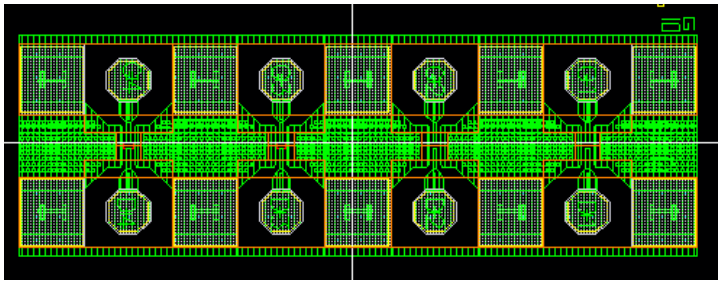
Tasks

The students' task is the extension of existing transistor models (65 nm CMOS) for the frequency range beyond 100 GHz. Based on that, simple mm-Wave circuits should be designed in order to verify the models. The work can be separated as follows:

- Comprehensive literature research on transistor modeling, on-chip calibration and de-embedding techniques
- Measurement and characterization of transistor test structures
- Development of suitable and scalable transistor models for the frequency range beyond 100 GHz
- mm-Wave circuit design for model verification



(a) RF-Transistor equivalent circuit model including parasitics



(b) Transistor structures including test fixtures in 65 nm CMOS

Contact

David Bierbüsse
Kopernikusstraße 16, 52074 Aachen
ICT cubes, 5th Floor, Room 541
+49 241 80 24647
david.bierbuesse@hfe.rwth-aachen.de
www.hfe.rwth-aachen.de