UNIVERSITÄT DUISBURG ESSEN

Fachgebiet Hochfrequenztechnik

H F T

Fachbereich Ingenieurwissenschaften
Abteilung Elektrotechnik und Informationstechnik

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Aufgabe der Abschlussarbeit im

ISE Masterstudiengang

für: Herrn Fei Xie

gestellt von: Prof. Dr.-Ing. K. Solbach
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Thema: **Investigation of the Novel Capacitively Coupled Patch Antenna (CCPA) for Mobile Communications**

Description of Problem:

In modern mobile phones, antenna elements are integrated with the printed circuit board (PCB). The typical antenna type is the planar inverted-F antenna (PIFA) which is mounted on the PCB to allow a flat envelope of the hand-held device. Many variants of this radiator type have been devised, including shorted and folded versions and multi-frequency antennas. The principle of operation is based on the quarter-wave patch antenna concept with a short-circuit at one end and an open-circuit at the other end of the patch. The PIFA is fed by a conducting probe connecting a feed transmission line on the PCB and the patch.

A novel concept, the “capacitively coupled patch antenna” (CCPA) was demonstrated recently which employs a capacitive coupling and matching of the patch to the feeding transmission line without galvanic contact between antenna and feed line.

Thesis Task:

The thesis task is an investigation of the novel concept using simulation and experiment. In particular the thesis shall cover

- the modelling and simulation using a field theoretical tool (Microwave Studio or HFFS)
- the design, manufacture and experimental evaluation of an antenna for 1 GHz operation using the network analyzer for the reflection coefficient measurement and anechoic chamber measurement system for the radiation pattern
- investigation of the optimum design parameters including the dimensions of the dielectric substrate (PCB) and of the patch
- modelling of the antenna as a network equivalent circuit using the ADS tool and measured or simulated reflection coefficients

For Bachelor students the thesis task can be limited to the manageable extent.

At the end of the thesis work, a public presentation is to be given of the results.