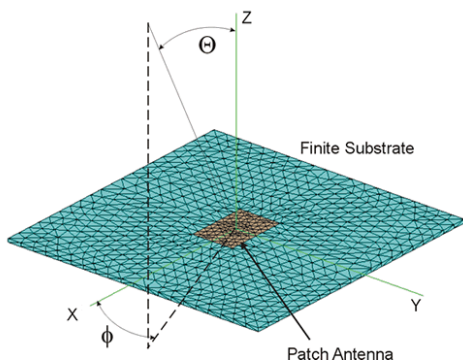
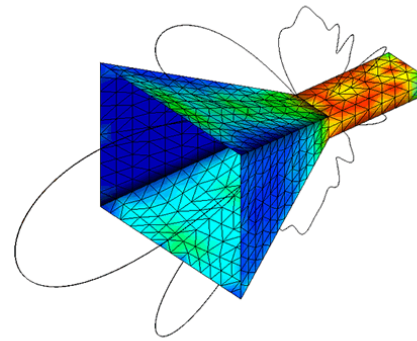


Design and Optimization of Antennas Using Space Mapping Technology

Supervisor: Slawomir Koziel

This research-oriented project aims at the development and implementation of space-mapping-based optimization of antennas. Space mapping is one of the most promising techniques for the design optimization of microwave structures. This methodology is founded on the idea of the optimization of computationally expensive or “fine” models by means of the iterative optimization and updating of so-called “coarse” models which are less accurate but cheaper to evaluate. Provided that the misalignment between the fine and coarse model is not significant, space-mapping-based algorithms typically provide excellent results after only a few evaluations of the fine model. Space mapping is widely used in the optimization of microwave devices where fine models are often based on full-wave electromagnetic simulations, whereas coarse models may be physically-based circuit models. The problem with applying space



mapping for antenna design is that computationally cheap coarse models are normally unavailable. The main goal of this project is to develop efficient methods for creating reasonably good coarse models for space-mapping-based design optimization of antennas. The construction of the coarse models will be based on the data obtained from the electromagnetic simulator working with the relaxed mesh requirements as well as suitable functional approximation techniques such as

kriging. The project will result in the implementation and testing of optimization algorithms as well as the development of several benchmark problems including various types of antennas.

The project will involve working with the design of experiments methods, approximation techniques, experiments using commercial electromagnetic solvers (FEKO and CST Microwave Studio), as well as programming in Matlab.

