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**Optimisation of the Frequency Response of Waveguide Filters through Application of Different Algorithms.**

***ABSTRACT - Masterthesis***

The company Mician GmbH is producer of the software "µWaveWizard" which simulates waveguide components in the satellite and mobile communication sector. Since several years software tools are used in industry to analyze and simulate the properties of electromagnetic wave propagation in waveguides. This strategy significantly shortens the development process, because the structure can be analyzed beforehand, instead of time spending manufacture of prototypes.

The application of software based development tools in terms of analysis as well as optimization increased fast in its significance. This means that the software varies the geometries of a waveguide filter as long as the predefined specifications get fulfilled. For this purpose different optimizer are applied, which work under different criteria. In the software "µWaveWizard" there are presently two random algorithms and one classical gradient algorithm, in which one of the random algorithms "Extrem" proved over years to be very efficient.

However, in the present program state it might come to the situation, that "Extrem" hangs up after locating a local error minimum (local best possible optimization) and doesn't leave the minimum anymore, instead of trying to locate the global minimum with different initial parameters. From the same author an approach called "Globex" is available, which is placed hierarchically above "Extrem" and serves to start "Extrem" again with different parameters, in case "Extrem" is not able to locate any better minimum.

Goal of the thesis is to implement this algorithm and to evaluate it with typical examples as filter, coupler and horn antennas. Interfaces are provided to control the software "µWaveWizard" with software tools, e.g. Visual C# or MATLAB. In this way it is possible to develop the optimizer separated from the actual program which is getting optimized.

Since other optimization algorithms are available in literature and in the internet as open source code as well as dynamic link library (.dll), the implementation is supposed to be modular so that other optimization algorithms can be implemented without additional effort.