1 Conclusion and Outlook

The optimization of the fuel cell shows that a desired power density curve can be approximated very well using genetic algorithms. Interestingly, GA reveals a non-obvious structure of fuel cell performance, where different parameter settings lead to the same power density curve. This means that the solution is not unique here, which in turn could be used for a specific desired parameter setting. For further investigations, it would be important to include or couple the temperature generated by the operation in the simulations, which for the sake of simplicity was chosen as constant for this work. Knowledge of the effect of this temperature on performance is desirable.

Next was the achievement of a statistically uniform and isotropic field studied in an electromagnetic reverberation cuboid chamber, with a Vivaldi antenna as source. The field turbulence was caused by a stirrer whose geometry plays a crucial role in the field distribution. In this work, the shape of the stirrer blades was optimized in order to achieve the best possible desired field distribution. This enabled the desired values to be achieved except for the real part of the field in the y-direction. In order to further improve the field distribution values, the number of stirrers was increased to three pieces. The wing shapes have been optimized. The field in the y-direction could be improved, but the field values in the other spatial directions deteriorated but remained within the tolerance range. Nevertheless, the desired acceptance limits for the field distribution in all spatial directions were maintained. For further investigations it would also be interesting to optimize the topology of the stirrer. To do this, one does not assume a rectangular sheet metal as the basic shape of a stirrer, but calculates the optimal shape completely mathematically. In a further step, a different approach to improve the field distribution was chosen. There for a certain number of two different geometric objects (cone and sphere) were attached to the wall chamber and their influence on the field distribution was examined. Here the hemispheres provided a better field distribution than cones, so this would be a better choice for further investigation. Here, the hemispheres provided a better field distribution than the cones, so the hemisphere was used for further investigations. Now an attempt was made to vary the number of hemispheres randomly on the wall in the chamber, but unfortunately this did not lead to a better distribution of the field. For further investigation, one should perhaps not make a random change in the number of geometric objects, but a systematic change. The influence of multiple hemispheres with different randomly chosen radii in chamber would be an interesting research project.