

Master 2019

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Design and optimization of composite ceramic with variable rod lengths.

ABSTRACT - Masterthesis

Analysis and Evaluation of Optimization Algorithms and Cost Functions for Constrained Antenna Optimization

Piezocomposites are a refinement of piezoceramics and have better properties in comparison. One variant of composite is called 1-3, which results in ceramic rods embedded in a polymer matrix. One problem of piezocomposites is that the aperture angle decreases with increasing frequency. In this thesis, the influence of variable rod lengths is investigated, which leads to a curvature of the contour and thus should allow a constant aperture angle over an investigated frequency range. To optimize the rod lengths an optimization algorithm is used which generates polynomial parameters. Using the polynomial parameters, one polynomial each is calculated to determine the front and the back side. By formulating a cost function, the optimization criterion is defined. Invalid solution proposals are sorted out by means of constraints. The aim is to always find the optimum solution for an almost constant aperture angle for various specifications such as the size of the composite or the frequency range investigated.