

# An Approach for Stability Analysis of Nonlinear Electrical Network using Antioptimization

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*Abstract* — In this paper an optimization based approach for stability analysis of electrical networks is addressed. The stability problem is transferred to an optimization problem for finding worst performance regarding stability criteria for a parameters range. If a violation of the criteria is found, instability of the system is proven. For design, the maximal possible design parameters can be scaled until a boundary is reached. In contrast to other present methods of stability analysis - Modal Analysis and \_ Analysis which are only suitable for linearized models- nonlinear models may be used directly by the optimization approach without the necessity of any averaging technique and linearization. This is necessary for systems like power electrical components with usually high nonlinear and wide ranging dynamics due to the very fast switching and a good solution for the stability analysis with industrial specified standards. The application of the proposed approach is illustrated via a regulated buck converter as a typical critical nonlinear component of the electrical network in the “More Electric Aircraft” architecture (MEA)