

In this paper, a methodology for fast multiobjective optimization of the miniaturized microwave passives has been presented. Our approach is applicable to circuits that can be decomposed into individual cells [e.g., compact microstrip resonant cells (CMRCs)]. The structures are individually modeled using their corresponding equivalent circuits and aligned with their accurate, EM simulated representations, by means of implicit space mapping (ISM). The ISM-corrected cells are then assembled into the entire structures and their Pareto-optimal solutions (here, representing the best possible tradeoffs between the structure size and electrical performance) are obtained using evolutionary methods. The refinement is then carried out for the selected structure realizations using, again, SM. The latter stage is necessary, because the cell-based equivalent circuit models do not account for EM cross-couplings between the cells. The proposed methodology allows for rapid identification of compromise geometries concerning size-performance tradeoffs and, more importantly, permits quality comparison of particular CMRC realizations from the point of view of their suitability for a given compact circuit implementation. Our approach is demonstrated using several variations of the three-section wideband impedance matching transformers consisting of two types of CMRC structures. Numerical validation of the results is provided.