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# COMPARATIVE ANALYSIS OF POWER DIVIDER NETWORKS WITH LARGE NUMBER OF PORTS USING DIFERENT NUMERICAL METHODS

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In order to design and analyze high-frequency microwave and millimeter-wave passive devices, the General Scattering Matrix (GSM) plays a very important role, and there are several methods for its computation. These tools employ different techniques such as the Finite Element Method and the Method of Moments. In this paper we address the analysis and comparison of the solutions of these methods for power divider networks and couplers with large number of ports. For this work we have also built some prototypes, taking into account symmetry, number of ports, and central cavity shape of these devices. The finite element method and the method of moments are currently employed in many applications like electromagnetic fields, fluids mechanics, etc. In computational electromagnetics, these methods are used to model the interaction of electromagnetic fields, focusing in the Maxwell's equations and using procedures to solve practical problems. These methods have one thing in common; subdivide the whole structure of device under the test into a discrete model. Dividing in samples has the advantage of representing eventual complex geometries and giving a good approximation of the solution. One of the applications of the devices that we will study is power amplification; this function is found in almost all microwave and millimeter-wave systems. The first step for the analysis of the power divider devices with the finite element method is to create the mesh, and then the structure of the device is divided into small parts considering the precision of the mesh. With the aim of improving the results more elements are added, but the processing time is increased. The cases of study will come from waveguide networks in H-plane and E-plane like radial dividers, conical dividers, and directional couplers. Due to the shape of the central cavity used in these devices, some differences in the numerical methods will become apparent.