Virtual Prototyping of a 10-Way Power Combiner with HFWorks

Description

Explore our validated 10-way power combiner simulation, precisely modeled as per [1]. Results closely align with reference measurements, highlighting the accuracy of our simulation. The illustration identifies the main input port (red arrows) and an output port (green arrows).

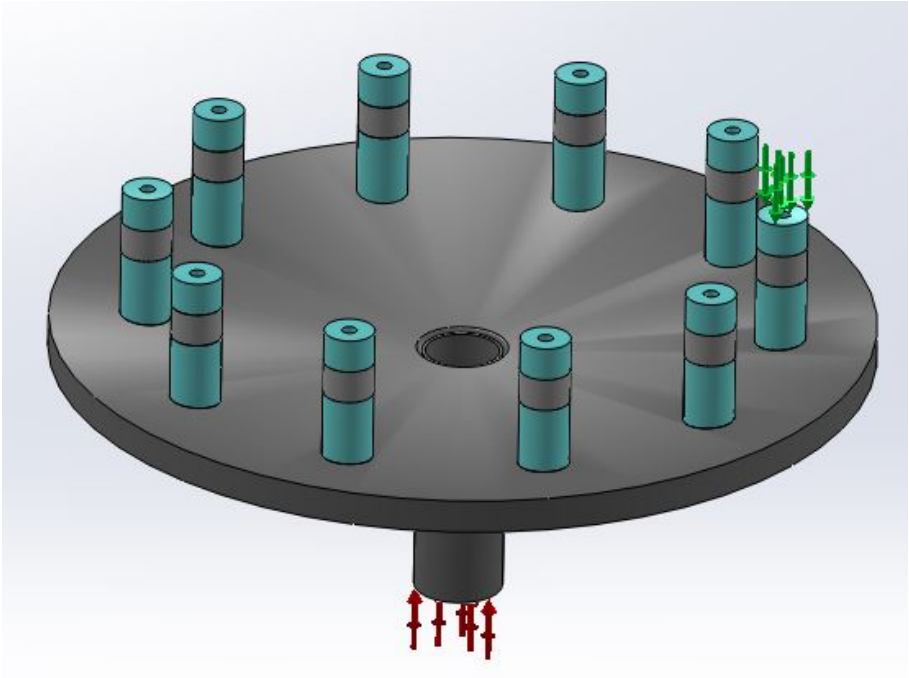


Figure 1: *the structure's 3D view in SolidWorks*

Simulation

The Scattering Parameters solver is ideal for analyzing structures like this, providing essential data such as Return Loss, Insertion Loss, Output Port Isolation, and signal phase shifts. It uses a finer mesh at discontinuities and transition faces, crucial for capturing impedance and geometry changes, ensuring high precision in simulations.

Loads/ Restraints

Ports are applied to the circular faces of the dielectrics, with TEM mode propagation indicated to the solver for improved accuracy. The structure functions as a vacuum cavity, with outer surfaces acting as Perfect Electric Conductors.

HFWorks allows users to visualize electric or magnetic fields in various formats, offering the flexibility to select the port for excitation. In the highlighted figure, the main central port is activated.

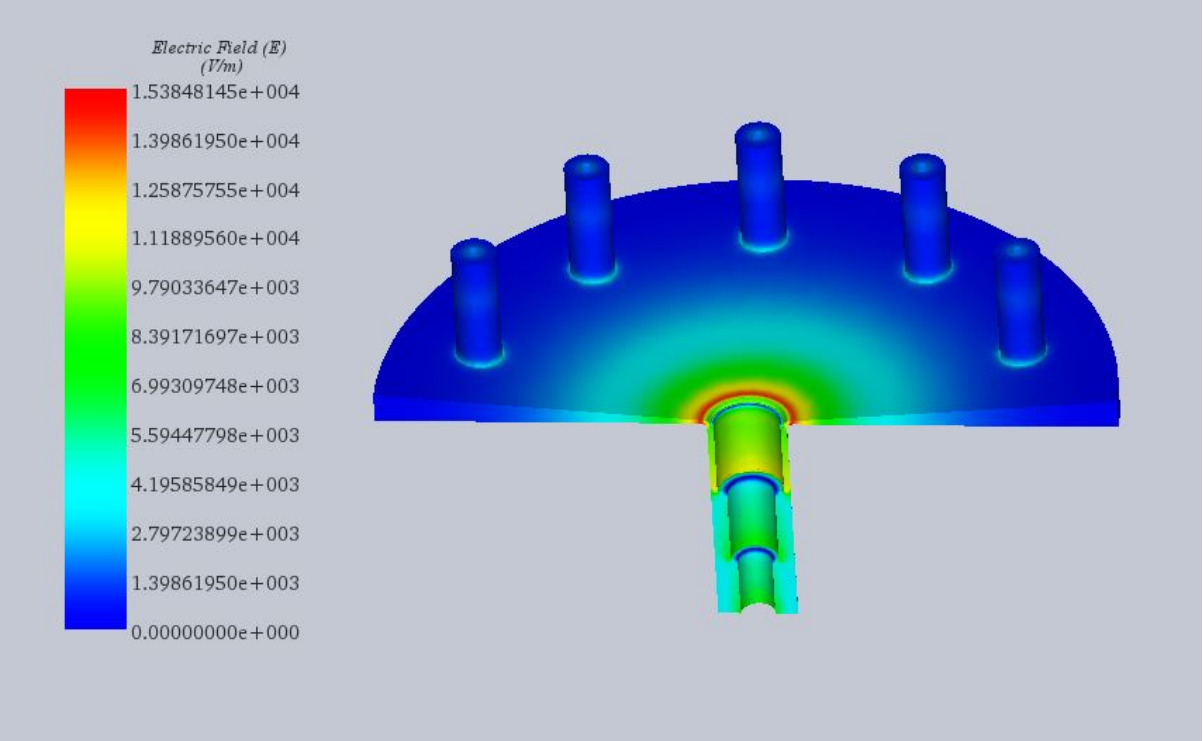


Figure 2: *3D Electric field distribution (Main Central Port is excited)*

Results

To confirm HFWorks simulator's accuracy, comparing simulation data with actual measurements is crucial. The accompanying figures detail the structure's insertion and return losses across the 2 to 20 GHz frequency range.

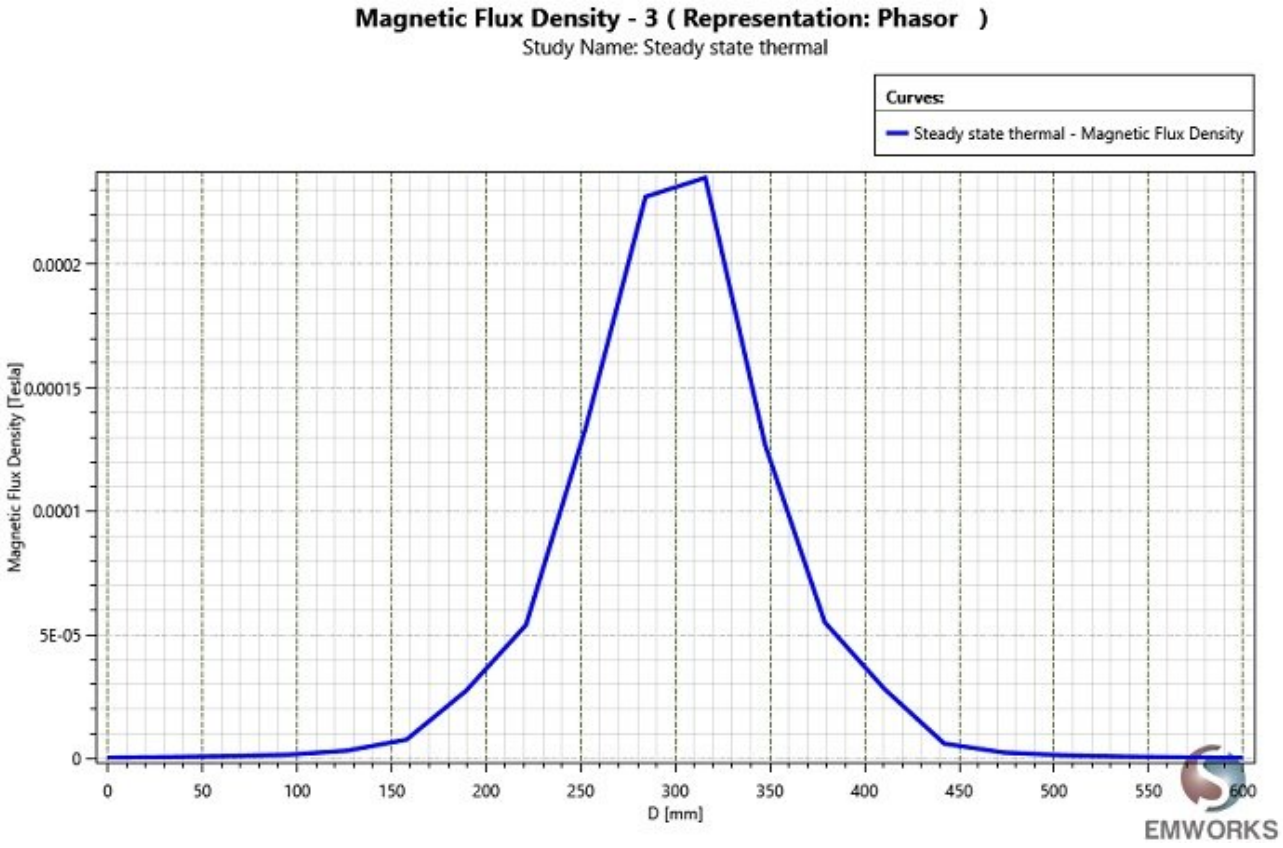


Figure 3: *A comparison of the simulated and measured reflection coefficients at the central output port*

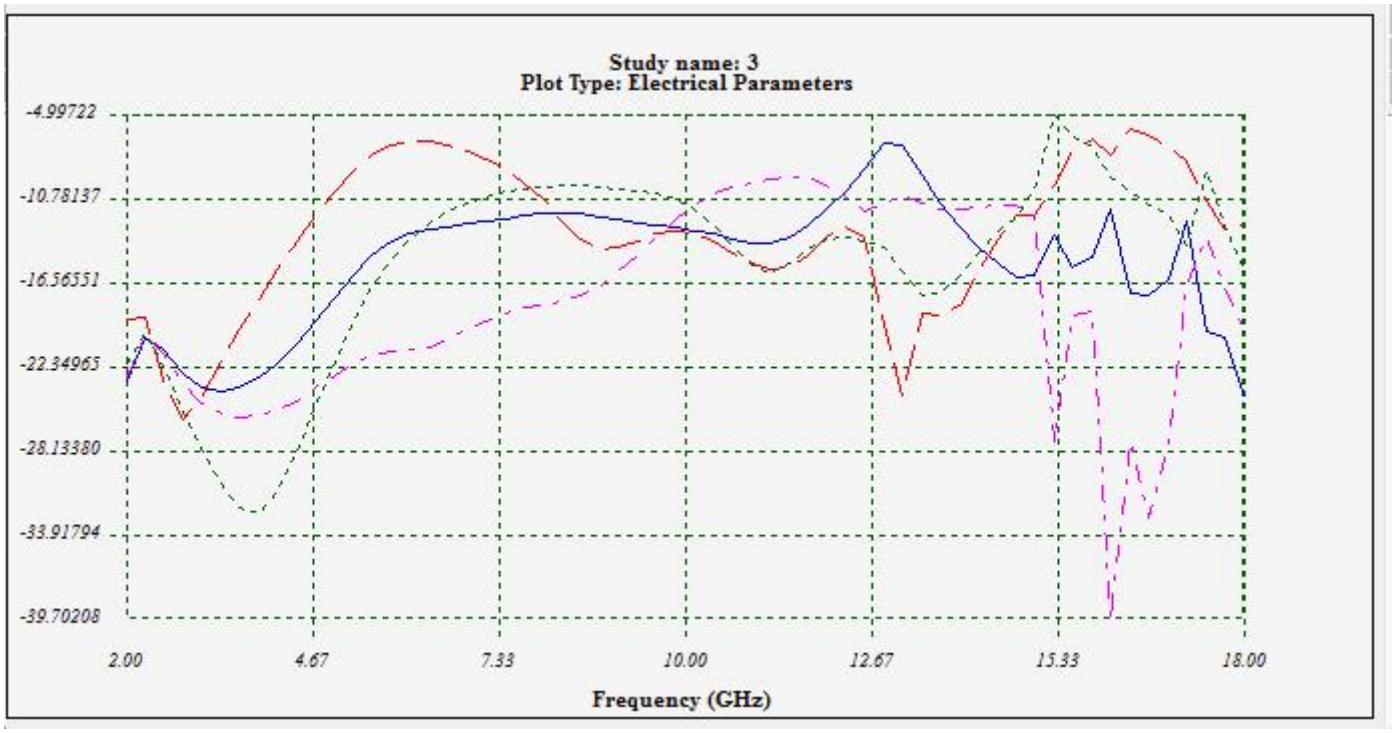


Figure 4: *Isolation between the output ports (S23, S24, S25, S26)*

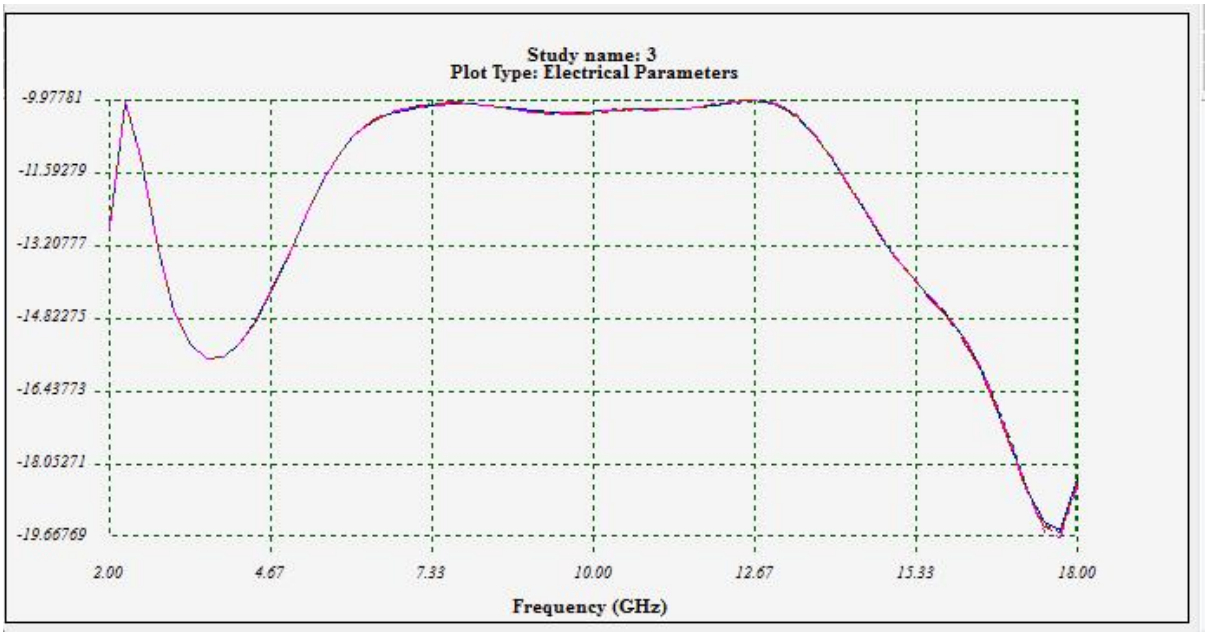
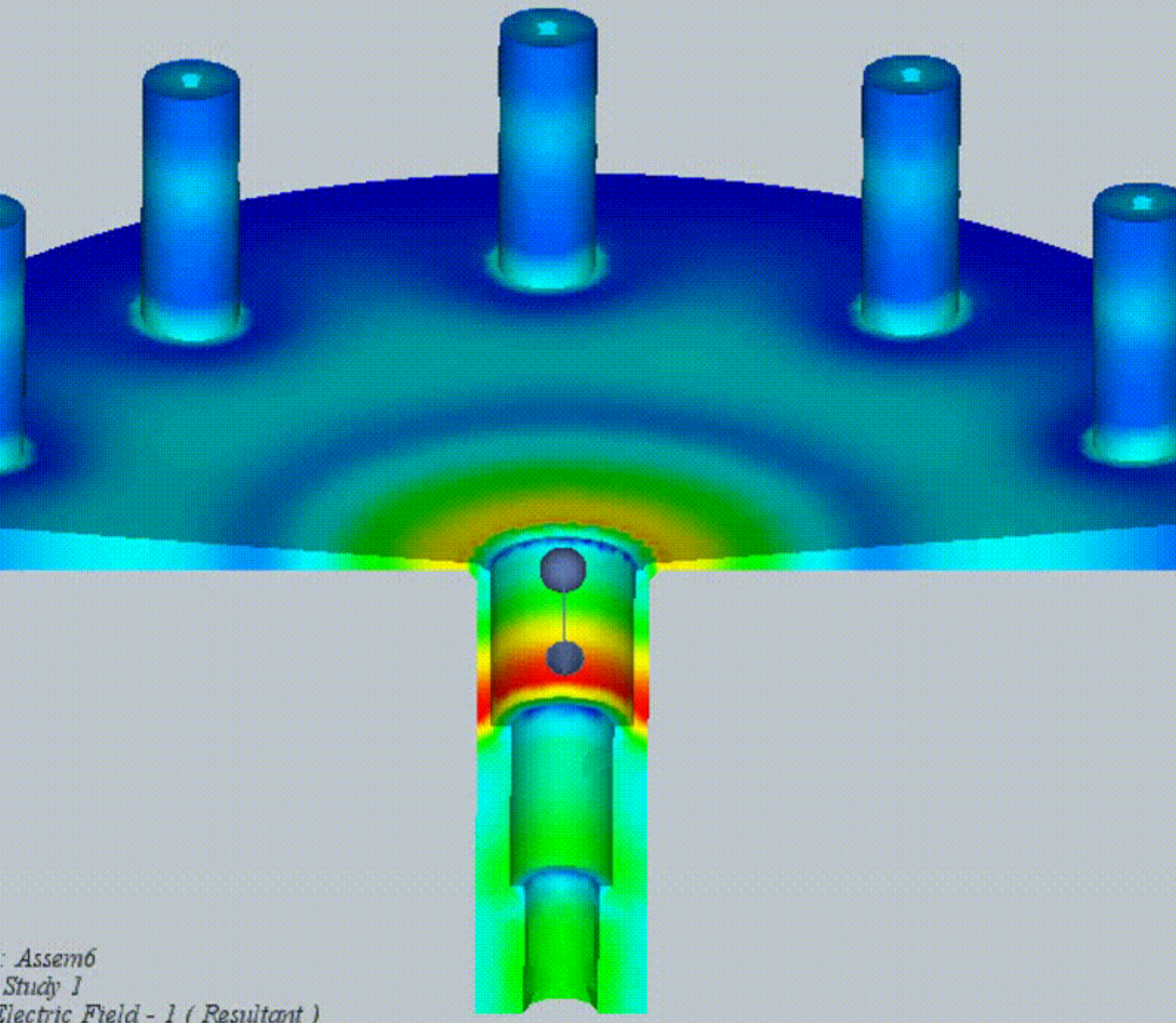


Figure 5: *Insertion losses from the main input to port N*



: Assem6
Study 1
Electric Field - 1 (Resultant)
: 12.505 (GHz)
tude
d Distribution
0 degree
e: 0.00000000e+000 to 9.99615918e+003