Contribution ID: **449** Contribution code: **WEP062** Type: **Poster Presentation**

One-to-one mapping between the electromagnetic modes of Cylindrical and Coaxial Half-wave cavities

Wednesday 13 August 2025 16:00 (2 hours)

Design of radio frequency (RF) couplers and diagnostics require a good understanding of the electromagnetic mode patterns of RF cavities. This study investigates the adiabatic transformation of transverse magnetic (TM) modes in a cylindrical cavity into transverse electromagnetic (TEM) modes of a coaxial cavity by gradually introducing an inner conductor. Using CST Studio Suite, we simulate the eigenmode evolution as the geometry transforms from a pure cylindrical to a coaxial configuration. We track the behavior of TM010 through TM014 modes to observe the continuous evolution into the corresponding TEM0 through TEM4 modes of the coaxial cavity. The process is governed by the evolution of the electric field orientation as the geometry shifts, enabling the axial TM fields to reorient into the radial electric field configuration of TEM modes. Field patterns, eigen-frequencies, and mode indentities are analyzed throughtout the transition. The results provide simulation-based evidence that TM to TEM conversion occurs without generation of newer eigenmodes, offering a valuable insight into the design of transition regions in superconducting RF (SRF) systems and provides a foundation for experimental validation.

Please consider my poster for contributed oral presentation

No

Would you like to submit this poster in student poster session on Sunday (August 10th)

Yes

Footnotes

Funding Agency

I have read and accept the Privacy Policy Statement

Yes

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