

RF and mechanical design of a 915 MHz SRF cavity for conduction-cooled cryomodules

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Conduction-cooled SRF niobium cavities are being developed for use in compact, continuous-wave electron linear accelerators for a variety of industrial applications. A 915 MHz two-cell cavity has been designed to achieve an energy gain of 3.5 MeV. The design of the cell shape aims at minimizing the peak surface magnetic field. Field flatness is achieved by adjusting the length of the outer end half-cells. The higher-order mode analysis shows that absorbers are not required for a moderate beam current of 5 mA. One of the beam tubes has two side-ports for insertion of coaxial fundamental power couplers. The mechanical design and analysis were done to maintain a stress near or less than 15.5 MPa for all anticipated loading conditions. This is half the measured yield strength and is to provide relief from creep when the cavity is evacuated and stored with outside atmospheric pressure.

Footnotes

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