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Measurement of Frequency, Temperature, RF Field Dependence of Surface Resistance of Superconductors Using a Half Wave Cavity[1]
HYEKYOUNG PARK, JEAN DELAYEN, Center for Accelerator Science, Old Dominion University — A theory of surface resistance of superconductor was rigorously formulated by Bardeen, Cooper, Schrieffer more than 50 years ago. Since then the accelerator community has been used the theory as a guideline to improve the surface resistance of the superconducting cavity. It has been observed that the surface resistance is dependent on frequency, temperature and rf field strength, and surface preparation. To verify these dependences, a well-controlled study is required. Although many different types of cavities have been tested, the typical superconducting cavities are built for specific frequencies of their application. They do not provide data other than at its own frequency. A superconducting half wave cavity is a cavity that enables us to collect the surface resistance data across frequencies of interest for particle accelerators and evaluate preparation techniques. This paper will present the design of the half wave cavity, its electromagnetic mode characteristics and experimental results.

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