

A novel test cavity setup for surface conductivity measurements of additive manufacturing samples

Tuesday 27 August 2024 16:00 (2 hours)

Additive Manufacturing (AM) has the potential to increase the performance of radio frequency (rf) cavity resonators while cutting manufacturing costs. To leverage this potential, AM processes and potentially post-processing techniques must be tailored to cavity requirements. Additionally, conventional manufacturing's quality assurance methods must adapt to the AM case requiring numerous studies on additively manufactured test bodies.

We introduce a compact rf cavity design, enabling cost-effective and precise studies of the surface conductivity of test bodies. The test body is mounted on a dielectric holder inside a cylindrical rf cavity made of aluminum. The geometry of the test body corresponds to a rod which allows simple and cost-effective production, post-processing and evaluation. The test body's surface conductivity is extracted from a measurement of the quality factor (Q_0) of the cavity.

Depending on the geometry of the test body, Q_0 values of over 10,000 can be achieved for copper test bodies. Thereby, the test body is responsible for up to two thirds of the total cavity loss. Studies will be presented demonstrating the precision of surface conductivity determination via Q -measurement and the impact of uncertainties in test body position and geometry.

Footnotes

Funding Agency

Primary author: Dr HÄHNEL, Hendrik (Goethe Universität Frankfurt)

Co-authors: DOLLINGER, Guenther (Universitaet der Bundeswehr Muenchen); Mr SONPAR, Julian (Goethe Universität Frankfurt); MAYERHOFER, Michael (Universitaet der Bundeswehr Muenchen); HELM, Ricardo (Universitaet der Bundeswehr Muenchen)

Presenter: Dr HÄHNEL, Hendrik (Goethe Universität Frankfurt)

Session Classification: Tuesday Poster Session

Track Classification: MC3: Proton and Ion Accelerators and Applications: MC3.6 Room temperature structures