

Lorentz Force Detuning Compensation for XFEL Pre-series Cavities at CMTB test stand in DESY

Superconducting resonant 9-cell TESLA cavity when operating with high gradients needs a very sophisticated setup and calibration procedures of supported accelerator sub-components and electronics. The RF power source needs also to be able to deliver stable high power RF pulse (~10 MW) without saturation. The RF power delivered to the cavity produces radiation pressure mainly due to Lorentz force. This pressure deforms the cavity walls and as a result produces a resonance frequency (1.3 GHz) shift of the cavity. The paper briefly presents the setup and calibration procedures to allow high gradient operation of the superconducting resonant cavity. It also shows the first results of several minutes operation of cav3 installed inside one of the pre series modules for XFEL at CMTB test stand. This cavity was setup for operation with gradients of more than 40 MV/m and compensated with piezo tuner to minimize the Lorentz force detuning effect during flattop region of 1.3 ms RF field pulse.

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