



Compendium of eigenmodes in third harmonic cavities for FLASH and the XFEL

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The resonant modes in the 9cell 3.9GHz bunch shaping cavity designed by FERMILAB in collaboration with DESY [1] and installed in FLASH at DESY were calculated up to the range of 10GHz in terms of the band structure of this design. The modal nature of this structure has previously been investigated by various parties [1]. We have extended this work to include a modal pictorial dictionary in which the nature of the modes can be readily identified as well as the R/Q's for each of the modes. Below 10GHz only monopole, dipole, quadrupole and sextupole bands exist for this particular structure. Herein we only consider the modal patterns of the bands themselves and have not included the beampipe modes in the pictorial dictionary. The R/Q definition that we use is that of [2]. In addition to the finite element simulations we also utilise a capacitive-inductive circuit model to achieve a rapid characterisation of the cavity.

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