Contribution ID: **12** Type: **Oral presentation**

Propagating Eigenmode Simulations in SRF Multi-Cavity Crymodules Using ACE3P

Tuesday, 2 October 2018 09:30 (30 minutes)

Abstract: The 1.3GHz 9-cell TESLA cavity has been adopted for the Linac of European X-ray free electron laser (XFEL) and SLAC Linac Coherent Light Source II (LCLS-II). In contrast to the operating modes of the cavities, the beam induced high-order-modes (HOM) will be harmful to the beam quality if they are trapped inside the cavities if not sufficiently damped. The trapped modes below the beampipe cutoff, which are damped by the HOM couplers equipped on each cavity, have been well investigated numerically and experimentally using one cavity assuming shorted beampipe ends for XFEL and LCLS-II 1.3GHz linac. It is desirable that the modes above the beampipe cutoff propagate through the cavities to the absorbers installed on the beampipe walls at each cryomodule (CM) ends. Simulating the propagating modes is essential for XFEL and LCLS-II machines and requires to be performed in a whole CM, which is computational challenging in terms of its problem size and complexity. Recently a nonlinear eigensolver that can properly handle the boundary condition for propagating modes is implemented in the Omega3P module of the 3D parallel simulation suite ACE3P. It allows the first-ever direct calculation of propagating eigenmodes in the CM. In this paper, we will present the propagating trapped dipole mode simulations in 1.3GHz TESLA 8-cavity CMs. Simulation results are validated against measurements.

Primary author: XIAO, Liling (SLAC)

Co-authors: NG, Cho-Kuen (SLAC); GE, Lixin (SLAC); LI, Zenghai (SLAC)

Presenter: XIAO, Liling (SLAC)

Session Classification: Numerical simulation – Modeling Approaches and Tools