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FullWave **simulations of ECRH RF beams in DIII-D plasmas**[1]
VLADIMIR SVIDZINSKI, LIANGJI ZHAO, JIN-SOO KIM, FAR-TECH, Inc., XI CHEN, MIRELA CENGHER, MICHAEL BROOKMAN, General Atomics — High resolution solution of wave equations in frequency domain in ECR frequency range for realistic Tokamak plasma parameters became feasible with the use of recently formulated hybrid iterative approach [V. A. Svidzinski, et. al. Phys. Plasmas, **25**, 082509 (2018)] for numerically solving discretized wave equations. This approach combines time evolution and iterative relaxation techniques into iteration cycles and it is implemented in code *FullWave*. 2D full wave modeling of ECRH RF beams in DIII-D plasma is performed in the cold and hot plasma models for outboard and top launch scenarios. Full FLR hot plasma response model, based on accurate numerical solution of linearized Vlasov equation is used to model beam propagation and absorption in the 2nd ECR harmonic region. All physics of RF beam propagation, such as diffraction, interference between the X and O modes in the beam, X-O mode conversion, beam splitting into the X and O mode beams and absorption at the 2nd ECR harmonic is captured in the simulations. A numerical technique to find an optimal beam polarization at the launcher to launch nearly a pure X or O mode beam in plasma is developed and tested. Details of RF beams modeling and the results of beams simulations using *FullWave* will be presented.

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