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A numerical analysis of the RF wave propagation under the sheath boundary condition in the ion cyclotron range of frequencies[1]
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Applying radio-frequency (RF) waves to heat plasmas and drive current is an important technique for magnetic fusion, and much research effort has been spent on improving the methods, particularly in the ion cyclotron range of frequencies. In this study, a numerical analysis is carried out in order to observe the RF wave propagation and its interaction with the sheath in the scrape-off layer. A two-dimensional finite element code is developed to test the effect of sheaths on waves in cold plasma with the equilibrium magnetic field having a small component into the wall. Here the C-Mod like parameters are used to construct the calculation domain, on which the sheath boundary condition proposed by D'Ippolito and Myra, and the absorbing boundary condition are imposed. Various mechanisms for antenna coupling to the slow wave (SW) and fast-wave coupling to the SW by the sheath boundary condition are qualitatively investigated.

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