Benchmarking of codes for electron cyclotron heating and electron cyclotron current drive under ITER conditions

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Abstract. Optimal design and use of electron cyclotron heating (ECH) requires that accurate and relatively quick computer codes be available for prediction of wave coupling, propagation, damping, and current drive at realistic levels of EC power. To this end, a number of codes have been developed in laboratories worldwide. A detailed comparison of these codes is desirable since they use a variety of methods for modeling the behavior and effects of the waves. The approach used in this benchmarking study is to apply these codes to a small number of representative cases. Following minor remedial work on some codes, the agreement between codes for off-axis application is excellent. The largest systematic differences are found between codes with weakly relativistic and fully relativistic evaluation of the resonance condition, but even there the differences amount to less than 0.02 in normalized minor radius. For some other cases, for example for central current drive, the code results may differ significantly due to differences in the physics models used.