Integrated simulation of ICRF heating in toroidal plasmas

S. Murakami, A. Fukuyama, T. Yamamoto and H. Nuga

Department of Nuclear Engineering Kyoto University, Sakyo, Kyoto 606-8501, Japan

Self-consistent and accurate modeling of wave-plasma interactions is one of the key issues in producing and sustaining burning plasmas. We have upgraded wave-related components of the integrated modeling code TASK in order to describe the absorption of ICRF waves by energetic ions. The full wave component was coupled with the Fokker-Planck component and the GNET code to describe the modification of the multi-species momentum distribution functions and to calculate the power deposition profile including the finite orbit size effects. The GNET solves the drift kinetic equation in 5D phase-space. The code is applied to the ICRF minority heating in a simple circular Tokamak. The analyses are carried out in the on and off axis heating cases. The characteristics of energetic ion distribution in the phase space are investigated. An asymmetry in the parallel velocity distribution is found depending on the minor radius position. These advanced modeling provides more accurate evaluation of the efficiency of wave heating and current drive in tokamaks and helical configurations.