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Modeling of helicon wave propagation and the physical process of helicon plasma production SHOGO ISAYAMA, TOHRU HADA, Graduate School of Engineering Sciences, Kyushu University, SHUNJIRO SHINOHARA, Tokyo University of Agriculture and Technology, Institute of Engineering, TAKAO TANIKAWA, Research Institute of Science and Technology Tokai University — Helicon plasma is a high-density and low-temperature plasma generated by the helicon wave, and is expected to be useful for various applications. On the other hand, there still remain a number of unsolved physical issues regarding how the plasma is generated using the helicon wave. The generation involves such physical processes as wave propagation, mode conversion, and collisionless as well as collisional wave damping that leads to ionization/recombination of neutral particles. In this study, we attempt to construct a model for the helicon plasma production using numerical simulations. In particular, we will make a quantitative argument on the roles of the mode conversion from the helicon to the electrostatic Trivelpiece-Gould (TG) wave, as first proposed by Shamrai. According to his scenario, the long wavelength helicon wave linearly mode converts to the TG wave, which then dissipates rapidly due to its large wave number. On the other hand, the efficiency of the mode conversion depends strongly on the magnitudes of dissipation parameters. Particularly when the dissipation is dominant, the TG wave is no longer excited and the input helicon wave directly dissipates. In the presentation, we will discuss the mode conversion and the plasma heating using numerical simulations.

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