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# Numerical Analysis of Isotope Effect in NIFS Negative Ion Source

Negative deuterium ion beam is utilized for Neutral Beam Injection (NBI), heating equipment of nuclear fusion plasma. However, when operation gas in National Institute for Fusion Science (NIFS) negative ion source for NBI is replaced from hydrogen to deuterium, increase in co-extracted electron current is observed (H. Nakano, JJAP2020). The beam power has been limited by the heat load due to the larger co-extracted electron current. The purpose of this study is to analyze isotope effects in the ion source through electron transport simulation using 3D kinetic particle tracking model KEIO-MARC code (T. Shibata, JAP2013, A. Hatayama, NJP2018). The KEIO-MARC code has been modified for application to the NIFS negative ion source, and can reproduce basic characteristics, such as electron flow by magnetic drift, filter effect, etc. In the presentation, isotope effects via sheath potential, both elastic and inelastic collisions, including coulomb collision will be discussed.

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