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Development of Numerical Methods to Estimate the Ohmic Breakdown Scenarios of a Tokamak MIN-GU YOO, Seoul National University, JAYHYUN KIM, National Fusion Research Institute, YOUNGHWA AN, YONG-SEOK HWANG, Seoul National University, SEUNG BO SHIM, HAE JUNE LEE, Pusan National University, YONG-SU NA, Seoul National University — The ohmic breakdown is a fundamental method to initiate the plasma in a tokamak. For the robust breakdown, ohmic breakdown scenarios have to be carefully designed by optimizing the magnetic field configurations to minimize the stray magnetic fields. This research focuses on development of numerical methods to estimate the ohmic breakdown scenarios by precise analysis of the magnetic field configurations. This is essential for the robust and optimal breakdown and start-up of fusion devices especially for ITER and its beyond equipped with low toroidal electric field ($E_T \leq 0.3$ V/m). A field-line-following analysis code based on the Townsend avalanche theory and a particle simulation code are developed to analyze the breakdown characteristics of actual complex magnetic field configurations including the stray magnetic fields in tokamaks. They are applied to the ohmic breakdown scenarios of tokamaks such as KSTAR and VEST and compared with experiments.

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