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Extension of Kinetic-Magnetohydrodynamic Model to Include Toroidal Rotation Shear Effect and its Application to Stability Analysis of Resistive Wall Modes

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Extension of the kinetic-magnetohydrodynamic model is presented to include toroidal rotation shear effect for the first time. The sheared rotation is introduced through generalization of the guiding center Lagrangian, yielding two additional terms in a quadratic form of mode-particle resonance. These two terms are overlooked in conventional models. The new model is applied to stability analysis of resistive wall modes (RWMs) successfully. Numerical results show that the rotation shear reduces RWM growth rates further, which is consistent with experimental results.

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Author: Dr SHIRAISHI, Junya (Japan Atomic Energy Agency)

Co-authors: Dr MATSUNAGA, Go (Japan Atomic Energy Agency); Dr HONDA, Mitsuru (Japan Atomic Energy Agency); Dr MIYATO, Naoaki (Japan Atomic Energy Agency); Dr HAYASHI, Nobuhiko (Japan Atomic Energy Agency); Dr IDE, Shunsuke (Japan Atomic Energy Agency)

Presenter: Dr SHIRAISHI, Junya (Japan Atomic Energy Agency)

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