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Rotation and rotation shear effects on resistive wall mode stability JUNYA SHIRAISHI, SHINJI TOKUDA, NOBUYUKI AIBA, Japan Atomic Energy Agency — To study the rotational effects on resistive wall mode (RWM) stability, especially to clarify where the effects are essential for stabilizing RWM (rational surface, Alfven resonant surface, plasma surface, etc), the historic matching problem for magnetohydrodynamic stability analysis [1] is revisited. The existence of the rotation requires the generalization of the Newcomb equation, which plays an essential role in the matching problem. The rotation brings about the split of singularity in the generalized Newcomb equation due to the Doppler shift. We point out that the resonant surface can deviate from the singularities if the mode has a real frequency, which indicates that the locations where the resonance occurs cannot be determined a priori. If the mode frequency is limited in a certain range, such as the RWM case, the range in which the resonance occurs is finite around the singularity. Hence the classical asymptotic matching method becomes invalid. In this study, it is shown that a newly proposed matching method [2], which generalizes the asymptotic one to use the layer with finite width, can resolve the difficulty.

[1] H.P. Furth, J. Killeen and M.N. Rosenbluth, Phys. Fluids 6, 459 (1963).
[2] S. Tokuda, J. Shiraishi et al., 22nd IAEA FEC TH/P9-20 (2008).

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