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Coupling of eigenmodes in “positive-feedback” system in 3D MHD magnetic reconnection with moderate guide field

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We are proposing a new model, “shock-evoking positive-feedback” model, in understanding the 3D fast reconnection. In the previous study, we applied random perturbation to a 3D current sheet with moderate guide field. The enhanced reconnection rate is triggered by the coupling of inflow and outflow regions of oblique mode (k_z is non-zero) on either side of current sheet. In order to reveal this phenomenon more clearly, we insert eigenfunctions of two rotational-symmetric modes on either side of the current sheet as the initial condition. We found that the accelerated cascading of the initial modes to shorter wavelength is the reason for the reconnection enhancement, namely the partition of the diffusion region. This result is compared with the development of a single mode on one side of the current sheet.