Temperature anisotropy effect on the tearing mode

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Effects of the temperature anisotropy on the tearing mode in an ion-scale thick current sheet have been investigated using the two-dimensional full particle simulations. Systematic survey has been performed fixing the ion-to-electron mass ratio to 25, and varying D and alpha_j = T_j,perp/T_j,para (D: the initial current sheet half thickness normalized by the ion inertial length, alpha_j: the temperature anisotropy for species j = ion or electron, T_j,perp and T_j,para: the temperatures perpendicular and parallel to the initial magnetic field for the species j). When the system size is set to Lx = lambda_max = 12D (lambda_max: the fastest growing mode of the tearing mode), D=0.6 is the critical thickness above which no significant growth of the tearing mode is expected for alpha_e = 1. However, alpha_e $>$ 1 allows both the growth rate and the saturation level of the tearing to increase rapidly at the super-critical thickness range via the excitations of the higher wave modes. When Lx = 24D and alpha_e $>$ 1, the saturation level of the tearing mode becomes much larger than the Lx = 12D case by way of the coalescence stage of the magnetic islands of lambda_max. Presence of the ion anisotropy alpha_i $>$ 1 also enhances the growth rate of the tearing mode, but the influence of alpha_i on the tearing is not as significant as that of alpha_e.