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Scalings Pertaining to Current Sheet Disruption Mediated by the Plasmoid Instability[1] YI-MIN HUANG, Princeton University, LUCA COMISSO, Columbia University, AMITAVA BHATTACHARJEE, Princeton University — Analytic scaling relations are derived for a phenomenological model [1] of the plasmoid instability in an evolving current sheet, including the effects of reconnection outflow. Two scenarios are considered: the plasmoid instability can be triggered either by an injected initial perturbation or by the natural noise of the system, where the latter represents the lowest level of fluctuations in the system. The leading order approximation for the current sheet width at disruption takes the form of a power-law multiplied by a logarithmic factor, and from that, the scaling relations for the wavenumber and the linear growth rate of the dominant mode are obtained. When the effects of the outflow are neglected, the scaling relations agree, up to the leading order approximation, with previously derived scaling relations based on a principle of least time.[2] The analytic scaling relations are verified with numerical solutions of the model. [1] Huang, Y.-M., Comisso, L., and Bhattacharjee, A., Astrophys. J. 849, 75 (2017) [2] Comisso, L., Lingam, M., Huang, Y.-M., and Bhattacharjee, A., Phys. Plasmas 23, 100702 (2016).

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