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Quasi-separatrix layers and three-dimensional reconnection diagnostics for line-tied tearing modes ANDREW S. RICHARDSON, JOHN M. FINN, Los Alamos National Laboratory — In three-dimensional magnetic configurations for a plasma in which no closed field line or magnetic null exists, no magnetic reconnection can occur, by the strictest definition of reconnection. A finitely long pinch with line-tied boundary conditions, in which all the magnetic field lines start at one end of the system and proceed to the opposite end, is an example of such a system. Nevertheless, for a long system of this type, the physical behavior in resistive magnetohydrodynamics (MHD) essentially involves reconnection. This has been explained in terms comparing the geometric and tearing widths. The concept of a quasi-separatrix layer was developed for such systems. We study a model for a line-tied system in which the corresponding periodic system has an unstable tearing mode. We analyze this system in terms of two magnetic field line diagnostics, the squashing factor and the electrostatic potential difference, which has been used in kinematic reconnection studies. We discuss the physical and geometric significance of these two diagnostics and compare them in the context of discerning tearing-like behavior in line-tied modes.

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