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Edge flows and their role in intrinsic rotation and the LH transition[1] AHMET Y. AYDEMIR, Institute for Fusion Studies, The University of Texas at Austin — As we enter the era of next-step devices like ITER, where external momentum sources may prove insufficient, intrinsic mass flows are becoming increasingly relevant because of their importance in macroscopic stability and transport. There are flows in tokamaks driven purely by the toroidal geometry itself, making them an integral part of all tokamak plasmas. Related to the Pfirsch-Schlüter fluxes and dipolar in nature, these flows are localized to the edge region because of temperature gradients. Within the separatrix they are essentially cross-field, accompanied by parallel flows in the scrape-off layer (SOL) that tend to provide global mass conservation. In a symmetric system, the toroidal component of the SOL flows has no net angular momentum; however, asymmetries introduced, for example, by a single-null field geometry, results in a net momentum source at the edge. Coupled with an effective inward momentum transport mechanism (e.g., momentum pinch), this source can drive an intrinsic core rotation in the absence of any external momentum source. These flows also have the correct symmetry properties to account for the increased power threshold for the LH transition when the grad-B drift is in the "wrong" direction.

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