

Abstract Submitted
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Concomitant generation of outflows and magnetic fields via Hall magnetohydrodynamics¹ SWADESH M. MAHAJAN, IFS, UT Austin, MAN-ASVI LINGAM, IFS, UT Austin and Dept. of Astrophysical Sciences, Princeton University — Conventional large-scale dynamo models rely on ideal magnetohydrodynamics (MHD) and generate magnetic fields. We use Hall MHD as our physical model, enabling us to treat flows and fields concomitantly. We show that this results in a mixture of large-scale magnetic and kinetic energies produced simultaneously, and the latter is manifest as outflows/jets. The large-scale Alfvén Mach number, an observable quantity, is intimately linked to its small-scale (turbulent) counterpart. In the limiting case where this quantity is much greater than unity, outflows are preferentially generated from a predominantly magnetic reservoir and vice-versa. We suggest that this phenomenon, the Dynamo-Reverse Dynamo mechanism, may explain the existence of astrophysical outflows with high values of observed large-scale Alfvén Mach numbers.

[1] M. Lingam & S.M. Mahajan, MNRAS, **449**, L36 (2015)

[2] S.M. Mahajan, N.L. Shatashvili, S.V. Mikeladze & K.I. Sigua, ApJ, **634**, 419 (2005)

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