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New exact plasma equilibria with axial and helical symmetry

Abstract: Exact closed-form solutions of magnetohydrodynamics equations, with and without dynamics, are derived under axial and helical symmetry assumptions. For each symmetry, two distinct families of solutions arise that correspond to different pressure profiles. One profile models plasmas supported by external pressure, and is suitable for the description of plasma configurations in a medium such as atmosphere. The second profile features higher pressure inside the plasma domain and models plasmas residing in a vacuum. Examples of solutions bounded and unbounded in the radial direction, including solutions with boundary current sheets, are presented and discussed. This work is joint with Jason Keller.