servations. This may be very useful as a first step to interpret full numerical simulations.

In the Cartesian model, the potential vector function A obeys a nonlinear elliptic equation, while for the axisymmetric model it is the magnetic flux Φ that obeys such equation. However, the differential operator as well as the source terms are different. In order to gain some insight on the different nature of the equations, we have compared the form of $q(A)$ and $q(\Phi)$ at the initial and final states in each model. The source terms depend directly on the derivatives of these functions. However, despite the fact that the aspect of these functions looks similar at a glance, the source terms Q_{xy} and Q_{zR} turn out to be absolutely different in the final state. This is a consequence of the nonlinearity of the differential equations.

We have focused first on models with uniform external gravity. We found that the axial model is more rigid than the Cartesian layer, in the sense that the magnetic field is less buoyant and the drainage of gas less efficient. In fact, in the axisymmetric model the matter shrinks in radius and generates a convergent flow that facilitates the achievement of pressure equilibrium with less deformation of the field lines. In order to have the same level of deformation of the field lines as in the Cartesian model with half the wavelength of $9c_s^2/g$, we need a perturbation of half the wavelength of $12c_s^2/g$, for $\alpha = 1$. Under uniform gravity, we find that a factor 5/4 enhancement in column density can be obtained in the axisymmetric model for the more unstable wavelength, which is modest as compared to the factor of 7/4 found in the Cartesian model. At the position of the wings of the condensations, the ratio of the magnetic-to-gas pressure becomes larger than 1 beyond a certain radius, because of the evacuation of gas in these regions. However, it is still approximately 10 times smaller than in Cartesian geometry.

We have examined a more realistic choice to describe the variation of the external gravitational potential in axisymmetric models. The main effects of a non-uniform gravitational acceleration is to modify the separation of magnetic valleys and therefore the timescale of the Parker instability. A factor of 2 enhancement in column density over its initial equilibrium value can be found in axisymmetric models with non-uniform radial gravity. Hence, unless this density enhancement is sufficient to initiate thermal or gravitational instabilities, the Parker instability should be thought of as setting the stage upon which other small-scale processes will be modeling the structure and evolution of the filament.

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