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On mass and linear momentum conservation for the evolution of magnetized plasma in a highly dilute plasma environment DANIEL BERDICHEVSKY, Independent Scholar — A non-force-free analytical 3-D magnetohydrodynamic (MHD) solution of a magnetic flux-rope (FR) is presented. This FR solution may explain the uniform propagation, beyond *$\sim$0.05 AU from the Sun*, of transients. i.e., coronal mass ejections commonly observed by today's missions like *The Solar Terrestrial Relations Observatory (STEREO)*, tracked in some cases up to 1 AU, and/or beyond. We present arguments on the transient evolution based on its mass and linear momentum conservation. For astrophysical observations – using, e.g., the Hubble telescope– of remnants in nebulae of pass supper-novae, as well other interstellar events this MHD solution(s) may further be a good way beyond gas-dynamics in the development of a coherent picture of shock and its driver, as they are becoming a current interpretation. Here, we require that the gravitational and magnetic forces balance each other, in the framework of the MHD theory for a simple model of the evolution of the transient magnetized plasma, assuming it interacts weakly with surrounding 'steady flows' in the presence of a point-like, gravitational field. When satisfying these ansätze we identify a relation between the transported mechanical mass by the transient with its geometrical parameters and the intensity of the magnetic field carried by the structure, in a way consistent with current observations.

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