Contribution ID : **513**   Type : **Poster**

Simulation of nonrelativistic jets using a solution of the Grad-Shafranov equation as the initial condition

Monday, 22 October 2018 15:40 (150)

There are several problems in the numerical simulation of jets of young stars: the results of calculations depend very much on the initial conditions, most of which are unknown from observational data. Analytical approaches, based on the solution of the Grad-Shafranov equation, can only provide a stationary one-dimensional picture of what is happening.

The purpose of this work is to combine the above two approaches, using the plasma configuration and its magnetic field, obtained by solving the Grad-Shafranov equation, as the initial conditions for the magnetohydrodynamic modeling of a jet. The dynamics of jet propagation through the surrounding space was investigated, morphology similar to the morphology of the observed jets was obtained. Also the stability of the solution of the Grad-Shafranov equation with finite perturbations was numerically investigated.

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Session Classification : Poster session and coffee-buffet

Track Classification : Particle physics: astroparticle physics