Long Term Simulations Of Astrophsical Jet in AGN (PROJECT ID yah79c)

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§1. Introdction

Although the acceleration and collimation mechanisms of the Astrophysical jets are still not well understood, these objects are believed to have accretion disks in their central regions. One of the most promising models for jet formation is magnetic acceleration from accretion disks (Blandford 1993). Blandford & Payne (1982) pointed out that a magneto-centrifugally driven outflow from a Keplerian disk is possible if the angle between the disk surface and the poloidal component of the magnetic field makes an angle of less than 60°. In order to have access to the observed time scale of jets and to know whether the jet formation becomes quasi-steady state, we performe long term nonsteady 2.5-dimensional MHD simulations of jets at the National Astronomical Observatory(NAO). We also want to know whether the time averaged physical quantities have the same characteristics as those in the steady state model and previous simulations .

§2. Rusults and Conclusions

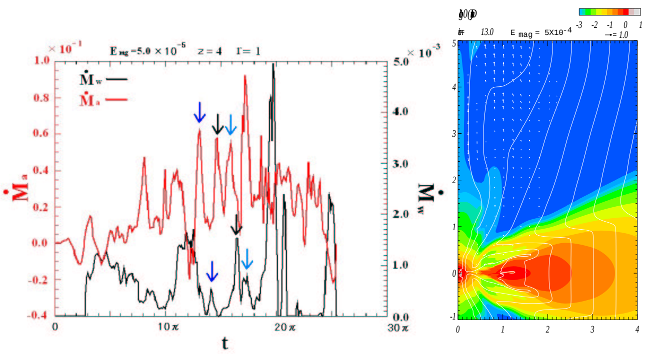

Fig. 1. On the right the time evolution of the density, and on the left the relation between mass ejection and accretion

In the early stage of evolution, a torsional Alfven wave is generated at the disk surface and propagates up into the corona. Since this wave extracts angular momentum, the rotating disk begins to fall into the central region. Because the magnetic field in the disk is weak, the surface layer of the disk falls faster than the equatorial part. Subsequently, the cold material on the disk surface is ejected as a jet. We also find hot outflow along the rotation axis and starting the channel flow in the disk due to the magneto rotational instability. This outflow is accelerated by the gas pressure enhanced by the infalling disk, and it consists of the material that is initially in the corona.