GRAVITATIONAL INSTABILITY OF ROTATING GASEOUS DISKS WITH MAGNETIC FIELDS

Takashi Nakamura, Takuji Iwata
Department of Physics, Kyoto University, Kyoto, Japan

The gravitational instabilities are investigated for rigidly rotating isothermal gaseous disks with a magnetic field whose mean direction is parallel (case A) and perpendicular (case B) to the rotation axis. The linearized equation for the perturbation becomes an eigen value problem which is solved numerically. The stability depends on two non-dimensional parameters $p^2 \equiv B_0^2/(4\pi^2 G\sigma_0^2)$ and $q^2 \equiv \Omega_0^2/(\pi G\rho_{0_c})$ where B_0, σ_0, Ω_0 and ρ_{0_c} are the magnetic field strength, the column density of the disk, the uniform angular velocity and the central density, respectively.

In case A, it is found that the effect of the magnetic field and that of rotation are co-operative. In case B, the stability depends not only on p^2 and q^2 but also on the direction of the wave vector of the perturbation. When the wave vector is parallel to the magnetic field, the disk is always unstable and the growth rate increases as a function of p^2 for a fixed q^2. This means, contrary to case A, that the effect of magnetic field and that of rotation are not co-operative, which is physically due to the suppression of the stabilizing effect of Coriolis force by the magnetic field.

FORMATION OF OB STARS BY RADIATIVELY-DRIVEN IMPLOSION

R.I. Klein
UC, Lawrence Livermore Natl. Lab., Livermore, CA 94550 USA
C.F. McKee
Phys. Dept. UC, Berkeley,CA 94720 USA
M.T. Sandford, R. Whitaker
Los Alamos Natl. Lab., Los Alamos, NM 87545 USA
P.T.P. Ho
Dept. of Astron. Harvard University, Cambridge, MA 02138 USA

1. THEORETICAL MODELS FOR RADIATIVELY-DRIVEN IMPLOSION

A theory for the sequential formation of OB stars in dense molecular clouds was first quantitatively investigated by Elmegreen and Lada (1976). The model was one-dimensional in nature and assumed shock propagation into homogeneous clouds. This picture has provided a successful explanation of the morphology of the Ori OB1 association.

We now know from observations (Stark and Blitz 1978) that giant molecular clouds exist in a myriad of irregular shapes and structures,

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