

THREE-DIMENSIONAL SIMULATIONS OF THE PARKER INSTABILITY UNDER A UNIFORM GRAVITY

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Using a newly developed isothermal MHD code, we have performed three-dimensional simulations for the nonlinear evolution of the Parker instability. The initial system is composed of exponentially-decreasing isothermal gas and magnetic field (along the y -direction) under an externally-given uniform gravity (along the z -direction). The size of the computational domain is set to be $12H \times 12H \times 12H$, Here, H is the e -folding scale height. $12H$ is close to the horizontal wavelength of the maximum growth in linear analysis. Random velocity perturbations have been added to the initial equilibrium state.

The evolution of the Parker instability can be divided into three stages: linear, nonlinear, and relaxed stages. 1) During the linear stage, the perturbations grow by accumulating gas in magnetic valley regions. In addition, small scale structures form along the x -direction. The agree with the predictions from linear analyses. 2) During the nonlinear stage, the structures become turbulent. In early epoch the main activity occurs close to the upper boundary, but later it moves towards the equatorial plane. Magnetic reconnection is accompanied, which allows mass flow across the field lines. This, in turn, results in the re-distribution of field lines. 3) In the relaxed stage, the system approaches a new equilibrium state. The flux-to-mass ratio has decreased in the region close to the equatorial plane, but increase in the region close to the upper boundary. So the relaxed system is stable against the Parker instability.

VARIABLE STARS IN THE INTERMEDIATE-AGE OPEN CLUSTER Mel 71

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We present the results of time-series CCD photometry for the intermediate-age open cluster Mel 71. Observations were carried out for four nights on February 1997 using the 1.8m telescope at Bohyunsan Optical Astronomy Observatory(BOAO). We have collected 160V frames and 2~3 U, B, I frames. The light curves for 429 stars in the central field of the cluster were examined to search for variable star candidates.

Four, maybe five, δ Scuti variable stars and one eclipsing binary were newly discovered in the observed field of the cluster. These variable stars have relatively short and multiple periods from $1^h.6$ to $3^h.5$, and low amplitudes from $0^m.02$ to $0^m.08$. Using results of new