[포IM-02] Instability of Magnetized Ionization Fronts

Woong-Tae Kim and Jeong-Gyu Kim
CEOU, Astronomy Program, Dept. of Physics & Astronomy, Seoul National University

An ionization front (IF) surrounding an H II region is a sharp interface through which a cold neutral gas makes transition to a warm ionized phase by absorbing UV photons from central massive stars. We investigate the structure and instability of a plane-parallel D-type IF threaded by magnetic fields parallel to the front. We find that magnetic fields increase the maximum propagation speed of the IFs, while reducing the expansion factor, defined as the density ratio of neutral to ionized phases. IFs become unstable to distortional perturbations due to gas expansion across the fronts, exactly analogous to the Darrieus-Landau instability of ablation fronts in terrestrial flames. The growth rate of the IF instability is proportional linearly to the perturbation wavenumber as well as the upstream flow speed. The IF instability is stabilized by gas compressibility and becomes completely quenched when the front is D-critical. The instability is also stabilized by magnetic pressure when the perturbations propagate in the direction perpendicular to the fields. When the perturbations propagate in the direction parallel to the fields, on the other hand, it is magnetic tension that reduces the growth rate, completely suppressing the instability when $\beta < 1.5$, with β denoting the square of the ratio of the sound speed to the Alfven speed in the pre-IF region. When the front experiences an acceleration, the IF instability cooperates with the Rayleigh-Taylor instability to make the front more unstable. We discuss potential effects of IF instability on the evolution and dynamics of IFs in the interstellar medium.

[포IM-03] Paschen α Galactic Plane Survey with MIRIS: the Preliminary Results for l=280°-100°

Il-Joong Kim[1], Jeonghyun Pyo[1], Woong-Seob Jeong[1], Wonyong Han[1], Won-Kee Park[1], Dukhang Lee[1], Bongkon Moon[1], Sung-Joon Park[1], Youngsik Park[1], Dae-Hee Lee[1], Kyeongyeon Ko[1], Kwang-Il Seon[1], Min Gyu Kim[2], Hyung Mok Lee[2], Toshio Matsumoto[3,4],
[1]*Korea Astronomy and Space Science Institute,*
[2]*Seoul National University*
[3]*Institute of Astronomy & Astrophysics, Academia Sinica,*
[4]*Institute of Space & Astronautical Science/Japan Aerospace Exploration Agency*

MIRIS (Multi-purpose Infrared Imaging System) is the primary payload on the Korean science and technology satellite, STSAT-3, which was launched on 2013 November 21. It is designed to observe the near-infrared sky with a 3.67° × 3.67° field of view and a 51.6″ × 51.6″ pixel resolution. Using two narrow-band filters at 1.88 μm (Pa α line) and 1.84+1.92 μm (Pa α dual continuum), the Paschen α Galactic plane survey has been carrying out, and the area for the Galactic longitude from +280° to +100° (with the width of $-3° < b < +3°$) has been covered by 2014 August 31. In this contribution, we present the preliminary results of the MIRIS Paschen α emission maps and compare them with other wavelength maps such as H α and dust maps. Many of the Paschen α features have been detected along the plane, and some of them are weak or invisible in the H α map and coincide well with dense cloud regions.