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Determination of a prominence's magnetic field through observations of Rayleigh-Taylor plumes

○ Andrew Hillier (京大), Durgesh Tripathi (IUCAA), Richard Hillier (Imperial College)

One of the most exciting discoveries by the Hinode satellite is that of the dark plumes, created through the Rayleigh-Taylor instability, that propagate upward through quiescent prominences. These plumes present a very exciting chance to study the magnetic Rayleigh-Taylor instability, as well as probe the internal structure of the prominence. In this paper, we present a method to use the observed plumes to determine the strength of the prominence magnetic field. The method employs the classic Hydro-dynamic result of flow around a circular cylinder, with appropriate MHD and compressibility corrections, to model the intensity enhancement at the head of a rising plume. Application to the 03-October-2007 prominence gave an estimate of the plasma beta of 0.2 - 0.7. This method may make it possible to estimate the magnetic field strength of the prominences that present plumes, improving our understanding of the observed phenomenon.