

Abstract Submitted
for the DPP09 Meeting of
The American Physical Society

Response of the Chromosphere to Penumbra Dynamics: Reconnection and Bow Shocks MARGARITA RYUTOVA, LLNL/IGPP, THOMAS BERGER, ZOE FRANK, ALAN TITLE, LMSAL — We present observations of sunspot penumbrae obtained during the disk passage of AR 10923 (2006 November 10-20) with the SOT instrument on Hinode in 4305 Å G band and Ca II H line. These observations allowed us to study new phenomena consisting in the appearance of bright elongated transients having a double structures, and abundantly pervading the entire penumbra. These transients, drifting as a whole in a direction almost perpendicular to their long axes, are clearly associated with the photospheric bright points emerging in a Y-shaped configuration formed by the reconnecting penumbral filaments. We find that a specific character of reconnection and post-reconnection dynamics in the photosphere, determined by a finite plasma beta and sharp stratification, provide necessary conditions for the formation of bow shocks generated by reconnected filaments moving upward with transsonic velocities. We present quantitative analysis, and show that calculated parameters of bow shocks, e.g. velocity, standoff distance, height of formation, lifetime, length, etc. are in good agreement with observations.

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Date submitted: 17 Jul 2009

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