SMALL-SCALE STRUCTURE, DYNAMICS, AND HEATING OF THE LOWER SOLAR ATMOSPHERE

S. Wedemeyer-Böhm

Institute of Theoretical Astrophysics, University of Oslo, Norway

The chromosphere of the quiet Sun is a highly intermittent and dynamic phenomenon. Three-dimensional radiation (magneto-)hydrodynamic simulations with CO5BOLD exhibit a mesh-like pattern of hot shock fronts and cool expanding post-shock regions. The pattern is produced by propagating shock waves, which are excited at the top of the convection zone and in the photospheric overshoot layer. The magnetic field is much more homogeneous in the model chromosphere than in the layers below but evolves much faster. The surface of plasma beta unity – on average at a height of 1000 km – separates two dynamically distinct domains where different wave modes prevail. Waves are of large interest with regard to the chromospheric heating mechanism, in particular after the possible heating by dissipation of acoustic waves became challenged by observations with TRACE. A contrary conclusion is derived via synthetic intensity image sequences for the numerical models discussed here. They provide an acoustic energy flux sufficient for heating the solar chromosphere, while a significant heating contribution might remain undetected due to the limited spatial resolution of available instruments. High-resolution observations – e.g. with the future ALMA – thus are badly needed for thorough comparisons with the present models and thus must be regarded the key to a comprehensive understanding of the wave nature of the solar chromosphere.