

# A numerical treatment for the unresolved transition region in the solar atmosphere

\*Haruhisa Iijima<sup>1</sup>, Shinsuke Imada<sup>1</sup>

1. Institute for Space-Earth Environmental Research, Nagoya University

In the solar atmosphere, the transition region between the chromosphere and the corona is very thin compared to the typical spatial scale in the chromosphere and corona. To fully resolve the transition region in the numerical simulations of the quiet Sun, the grid size must be on the order of a kilo-meter or less, which is difficult to achieve in the multi-dimensional simulations. The requirement on the numerical resolution becomes even more stringent in the hotter atmosphere, like the active/flaring regions. In this study, we propose a new technique to numerically broaden the unresolved transition region without affecting the energy balance in the solar atmosphere. The performance of the proposed method is tested in terms of the time variation of the spectroscopic observables in the optically thin approximation. Using this method, the Doppler shift and non-thermal line width of the synthesized line emission are expected to agree with those of the high-resolution reference simulation within an error of a few km/s.

Keywords: Magnetohydrodynamics (MHD), Solar transition region, Numerical simulation