M21a Synthetic Stokes Profiles of Ca II 8542Å for Shock Waves in Simulated Solar Chromosphere

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It is considered that shock waves drive many solar chromospheric phenomena such as spicules, and contribute to the chromospheric heating. The polarization signatures can provide information on the magnetic field, which may highly affect the dynamics of the shock waves, but has not been well investigated so far. We studied the Ca II 8542Å synthetic Stokes profiles of 2D realistic radiative MHD simulation, in which we reproduced a well-relaxed unipolar atmosphere. Chromospheric shocks appear ubiquitously with 30% tending to propagate upward in $\pm 20^\circ$ of vertical direction, at a speed of 10-20 km/s. The Stokes features of shocks could be categorized as two cases depending on the attacking angle between the magnetic field and the propagation direction. Only fast shock appears in the perpendicular case with 30% of shocks lying in 70-90° of attacking angle, indicating the expansion of domes. In this case, strong linear polarization signal appears while Stokes V profile shows sign reversal on the edges of shock front and contains a transition zone in the center. The parallel/oblique case contains slow shocks and the other fast shocks, in which Stokes V feature shows considerable signal without sign reversal. We suggest that polarization signal of shock waves could help revealing the magnetic structure of domes in the chromosphere.