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The influence of particle beam heating to optical hydrogen lines

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Abstract. In the context of interpreting non-thermal hard X-ray emission emanating from the footpoints of flare loops, all contemporary flare models assign a fundamental role during the flare energy release, transport and deposition to the high energy non-thermal particle beams. In the impulsive phase of flares, the beams formed by charged particles are guided from the acceleration site, wherever it is located, downwards along the magnetic field lines into the transition region, chromosphere and photosphere. In the lower atmospheric layers, due to the high density of local plasma, their kinetic energy is efficiently dissipated, the corresponding regions are rapidly heated, and dramatic changes of temperature and hydrogen ionization occur. We present some results of a time dependent radiative-hydrodynamic modelling of formation of optically thick hydrogen spectral lines Hα, Hβ and Hγ in the early phase of solar flares heated by time modulated electron and neutral beams with power-law spectra. We concentrate on the signs of particle beams in the line profiles and contribution functions of the above mentioned lines.