INVESTIGATION OF A LOWERING HXR FOOTPOINT SOURCE HEIGHTS DURING IMPULSIVE PHASE OF SOLAR FLARES

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The thick target model, is well developed. It gives an opportunity to diagnose the physical conditions within flaring structure. The thick target model predicts that in flare footpoints we should observe lowering HXR sources altitude with increasing energy. The footpoint HXR sources are the effect of direct interaction of non-thermal electron beams with plasma in footpoints. Therefore we can estimate the plasma density distribution along the non-thermal electron beam directly from observations of altitude-energy relation obtained for HXR footpoint sources. However, the relation is not density dependent only. Its shape is also determined by the power-law distribution of HXR flux. Additionally, during impulsive phase, the plasma density and degree of ionization within footpoints may change dramatically due to heating and chromospheric evaporation. For this reason the interpretation of observed HXR footpoint sources altitudes is not straightforward and needs detailed numerical modelling of the electron precipitation process. We will present the results of numerical modelling of several well observed solar flares. We use HXR observations obtained by RHESSI. The numerical model was calculated using the modified hydrodynamic 1D Solar Flux Tube Model (see Mariska et al.1982,1989; Falewicz et al.2011, 2014 for details) with applied Fokker-Planck formalism for non-thermal beam precipitation. The obtained results significantly improve our understanding of non-thermal electron beam precipitation and allow to refine the energy balance in solar flare footpoints during the impulsive phase.