ON THE ORIGIN OF HELIOSEISMIC RESPONSES ASSOCIATED WITH FLARES

V.V.Zharkova [1] and S.I. Zharkov[2]

[1]*Department of Computing and Mathematics, University of Bradford, Bradford, UK;v.v.zharkova@brad.ac.uk*
[2]*Department of Applied Mathematics, University of Sheffield, Sheffield, UK; s.zharkov@sheffield.ac.uk*

We present a comparative study of the momenta and start times measured from the TD diagrams and local hollography methods for solar quakes for a few different flares with those delivered to the photosphere by the hydrodynamic shocks caused by different kinds of high energy particles. The particle parameters are deduced from hard X-ray and γ-ray emission. The resulting hydrodynamics by energetic protons is shown to deliver momentum high enough and to form the hydrodynamic shocks deeply in a flaring atmosphere. These shocks are found capable of delivering the measured momenta to the photosphere through much shorter distances and times then those by pure energetic electrons. We also explore the non-thermal ionization of the ambient plasma by high energy particles and its effect on Ni line $6768\mathring{A}$ variations during these flares. This joint hydro-radiative approach allows to understand the observational results for solar quakes obtained simultaneously by the time-distance diagram and hollography techniques.