MAGNETOSEISMOLOGY OF SOLAR FLARES

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Recent observations of helioseismic response to solar flares have revealed an interesting relationship between the seismic waves, propagating through the solar interior in active regions, and the wave-like process of magnetic reconnection in the corona. In several cases, the observed flare seismic waves are highly anisotropic with the strongest wave amplitude in the direction of the expanding flare ribbons. The flare ribbons represent the footpoints of the reconnecting magnetic field lines, which move apart during flares because the magnetic reconnection gradually extends into higher and higher atmospheric layers, according to the standard flare model. The seismic waves are excited by the hydrodynamic impact (caused by heating of the chromospheric plasma by high-energy electrons) at the rapidly moving footpoints of the reconnecting magnetic lines . The supersonic motion of these seismic sources (footpoints) on the solar surface results in strong anisotropy in the seismic wave amplitude. I present the helioseismic, optical, EUV and X-ray observations from the space missions SOHO, RHESSI, TRACE and HINODE, which demonstrate the chain of the wave processes in solar flares, and discuss the physics of the observed wave phenomena.