Oscillatory processes in solar flares

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Modern spaceborne and ground-based observational facilities have revolutionized our understanding of physical processes operating in the hot, rarified and highly magnetized plasmas of the solar corona. One of the major recent breakthroughs is the confident detection of spatially- and temporary-resolved wave and oscillatory processes in quite and active coronal plasma systems. Radio, X-ray, gamma-ray and visible light emission generated by solar flares often contains very pronounced quasi-periodic pulsations (QPP), which can be considered a common (and possibly even intrinsic) feature of flaring energy releases. Physical mechanisms responsible for the generation of long QPP (with the periods longer than 1 s) are likely to be associated with MHD processes, and can be split into two groups: "load/unload" mechanisms and MHD oscillations. Load/unload mechanisms are repetitive self-inducing or triggered regimes of magnetic reconnection. MHD oscillations are caused by magnetoacoustic and Alfven waves in coronal plasma structures. In the case of MHD oscillations, the periodicity of QPP is determined either by the presence of some resonances, e.g. standing modes of plasma structures, or by wave dispersion. Observational investigation of the flaring QPP and their theoretical models and interpretations are discussed.