Correlated Quasi-periodic Fast-mode Magnetosonic Wave Trains and Flare Pulsations: Implications for Pulsed Magnetic Reconnection in the Solar Corona

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Quasi-periodic fast propagating wave trains (QFPs; Liu et al. 2011, 2012 ApJ) are a new observational phenomenon recently discovered in extreme ultraviolet (EUV) by SDO/AIA. They are fast-mode magnetosonic waves, usually originate from flares, and propagate at typically 500-2200 km/s within funnel-shaped waveguides. QFPs share some common frequencies usually in the 20-400 sec range with quasi-periodic pulsations in radio to hard X-ray emissions of the accompanying flares. This suggests a common physical origin, e.g., repeated energy-release episodes caused by pulsed magnetic reconnection. QFPs can thus serve as a new diagnostic tool to probe flare energy release and magnetic reconnection processes. We will present recent observational and numerical results of QFPs and compare them with flare pulsations, with special attention paid to possible modulations of the reconnection process by MHD waves and/or instabilities (e.g., Ofman & Sui 2006 ApJL). Observational examples include the 2010-Aug-01 C3.2 flare/CME event with correlated QFPs (Liu et al. 2011 ApJL) and zebra-shaped radio bursts (Karlicky 2014 A&A). We will also present an initial survey of QFP-correlated flare pulsations in IRIS data in search of a possibly alternative, subsurface origin of their periodicities.