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Decay-less oscillations of turbulent loops

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High-resolution, high-cadence EUV observations over the past decade have led to the discovery of a decay-less regime of kink oscillations in coronal loops. The means of excitation and sustaining such oscillations over many wave periods against energy dissipation mechanisms such as phase mixing and turbulence is still an unknown. Therefore, identifying the true nature of these decay-less oscillations is not only essential for their role as diagnostic tools for coronal seismology, but also for understanding their contribution to heating of the solar atmosphere. To that end, we will be presenting results of 3D magnetohydrodynamic simulations for continuously driven transverse waves in models of straight flux tubes in coronal conditions. Different driving mechanisms will be considered, from monochromatic transverse drivers, to oscillations driven by vortex shedding. We will focus on the manifestation of KH instability-induced turbulence in the cross-section of our simulated coronal loops, and the observational signature of the out-of-phase motions in synthetic data targeting instruments like SDO/AIA, Hinode/EIS and future missions such as MUSE. Parallels will be drawn between our numerical models and those of impulsively oscillating loops, multi-stranded loops and loops driven by more complex drivers. Finally, the energy content of the driven oscillations of our turbulent loops will be discussed, showing how the underlying energy fluxes from low amplitude decay-less kink oscillations can potentially be of the order of the radiative losses for the Quiet Sun.

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