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Ultra-long-period Oscillations in EUV Filaments near to Eruption

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We investigate whether or not ultra-long-period oscillations in EUV filaments can be related to their eruption. We report new observations of long-period ($\sim 10 - 30$ h) oscillatory motions in an apparently quiescent filament as it crosses the solar disk, in a 12-minute-cadence SoHO/EIT 195Å uninterrupted dataset. This dataset is chosen to explore characteristics of the filament oscillations depending on its eruptive behaviour, which is observed while the filament is still on the disk. The periods are found to increase in a near-stable regime prior to eruption. For the two sequences reported so far, we compare and link the EUV filament oscillations with pulsations in full-disk solar EUV irradiance from SoHO/CELIAS/SEM 304Å flux measurements. In intervals with stationary periods, we find that the 304Å pulsations and the 195Å filament oscillations have similar periodicities, but are phase-shifted by about a quarter of period. The two-wavelength correlation serves to show that, when the filament is the dominant dynamical feature but can no longer be tracked on the disk, the full-disk irradiance may provide a mean to identify the period increase prior to the filament eruption. We use the periods thus obtained to estimate the height increase of filaments' suspending coronal magnetic field lines, based on a magnetohydrodynamical (MHD) wave interpretation of the oscillations. The results are consistent with changes in prominence heights detected off-limb and thus support the seismological tool employed. Other interpretations connected with thermal over-stability or MHD piston effect are possible. These theoretical predictions however do not explain the quarter-period shift between the two EUV-wavelength signals. In any case, the detected variations may provide a powerful diagnostic tool for the forecasting of prominence eruptions.