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Predator-prey modeling of the coupling of co-propagating CAE to kink modes[1] ERIC FREDRICKSON, PPPL, NSTX TEAM — Co-propagating Compressional Alfven eigenmodes (CAE) with shorter wavelength and higher frequency than the counter-propagating CAE and Global Alfven eigenmodes (GAE) often accompany a low frequency n=1 kink. The lower frequency CAE and GAE are excited through a Doppler-shifted cyclotron resonance; the high frequency CAE (hfCAE) through a simple parallel resonance. We present measurements of the mode structure and spectrum of the hfCAE, and compare those measurements to predictions of a simple model for CAE. The modes are bursting with a typical burst frequency on the order of a few kHz. The n=1 kink frequency is usually higher than this, but when the kink frequency does drop towards the hfCAE burst frequency, the hfCAE burst frequency can become locked with the kink frequency. A simple predator-prey model to simulate the hfCAE bursting demonstrates that a modulation of the growth or damping rate by a few percent, at a frequency near the natural burst frequency, can lock the burst frequency to the modulation frequency. The modulation of the damping rate is postulated to be through a coupling of the kink with a symmetry-breaking error field. The deeper question is how the kink interaction with a locked mode can affect the damping/growth rates of the CAE.

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