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Periodicity of the Benjamin-Feir Instability and Linear Superposition JUSTIN CUTRER, KEDRIC HAYES, JESSICA GRABER, Xavier University of Louisiana — Freak waves are waves of great height that appear out of nowhere from otherwise ordinary, if rough, seas. The steepness of these waves can cause an enormous amount of damage to ships and oil platforms. Understanding the cause of freak waves will help us to predict dangerous conditions, and engineer structures better able to withstand such waves. A number of mechanisms have been studied as the source of freak waves, including linear focusing, refraction of waves through a current field, and nonlinear effects. The Benjamin-Feir instability solves the nonlinear Schrodinger equation when a carrier band of frequency ω_0 is perturbed by sidebands of $\omega_0 \pm \Delta\omega$. These solutions are periodic, or "breather," solutions under the condition that $\Delta\omega < \omega ka\sqrt{2}$, where ka is the wave steepness determined by k, the wavenumber, and a, the wave amplitude. In this poster, we will compare the period of these breather solutions with the period of the envelope of the linear superposition of the same carrier wave and sideband perturbations using MatLab movies.

Jessica Graber
Xavier University of Louisiana

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