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Dynamics of Crescentwave Patterns in a Channel

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Solving the full set of water wave equations, we perform numerical simulations of evolution of class II instabilities. We reproduce the well known steady horse-shoe patterns and the newly discovered oscillating horse-shoe. For small initial steepness of the basic Stokes wave, we identify the existence of a recurrence cycle similar to the Fermi-Pasta-Ulam recurrence for modulational instability. We further study the feasibility of experimental observation of such patterns and give an explanation for the selection mechanism responsible of trigging non-dominant instability leading to the formation of the oscillating patterns.

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