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Unidirectional Steep Waves in Wave Tanks

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A nonlinear focusing process in which a single unidirectional steep wave emerges from an initially wide amplitude- and frequency-modulated wave group at a predicted position in the laboratory wave tank is studied both theoretically and experimentally. The spatial version of the Zakharov equation was applied in the numerical simulations. Experiments were carried out in two facilities which have substantially different scales: in the Tel-Aviv University wave tank, which is 18 m long, and in the Large Wave Channel in Hanover, which is 330 m long. Comparison between the experimental studies in both facilities and the corresponding numerical results is carried out. Good agreement was obtained between experiments and calculations. The effect of dissipation and bound waves is discussed.

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