Abstract Submitted
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Stability of Surface Gravity Waves on Constant Vorticity Current[1] JAMES STEER, University of Edinburgh, DIMITRIS STAGONAS, EUGENY BULDAKOV, University College London, ALISTAIR BORTHWICK, TON VAN DEN BREMER, University of Edinburgh — Nonlinear surface gravity waves are subject to an instability that can lead to the generation of spectral-sidebands and the eventual break-up of the waves known as modulational (or Benjamin-Feir) instability (Benjamin & Feir, 1967, J. Fluid Mech.). The instability is captured by the nonlinear Schrödinger equation. The stability of unidirectional surface waves on a sheared current with constant vorticity may be described by deriving a relevant non-linear Schrödinger equation (the vor-NLS equation), as derived by Thomas, Kharif & Manna (2012, Phys. Fluids). We report on experiments examining the stability of modulated periodic wavetrains in a laboratory flume, where the waves are superimposed on a vertically sheared current with a constant vorticity. We keep the shear profile constant along the length of the tank and are able to observe stabilisation of instabilities compared to the case without shear. We obtain estimates of the observed growth rate of the sidebands to predictions based on the vor-NLS equation.

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