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Spatio-Temporal Measurements of Capillary-Gravity Waves

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Small scale surface waves in the capillary-gravity region can be easily advected by surface currents from all sources. Temporal measurements using fixed-point wave probes, therefore, cannot resolve reliably the spatial or wavenumber structure of short waves unless the surface currents are also monitored, which is an even more difficult task than surface wave measurement. A two-dimensional scanning slope sensor system is developed to perform 4D measurements [z(x,y,t)] of small scale surface waves. The data yield 3D spectrum [B(kx,ky,omega)] covering the capillary-gravity wave scales. Reflection of short waves as described by Shyu and Phillips can be clearly seen. The directional properties of small scale waves would be influenced by this mechanism greatly. These data can be used to investigate the balance of source functions in the wave action conservation equation following the approach suggested by Phillips.

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