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Wave tank studies of parasitic capillary ripple and its influence on radar backscatter

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Results of wave tank experiments on the excitation of so-called parasitic capillary ripple by steep gravity waves studied using optical and radar methods are re-analyzed. It is obtained that the ripple is quasi-stationary, i.e. the phase velocities of the ripple and of the carrying (master) gravity waves are close to each other, and the critical (threshold) steepness of the carrying waves measured using optical methods (by a laser slope meter) is about 0.1 in a wide range of the carrying wave frequencies. The same value of the threshold steepness is obtained from Ka-band radar measurements. Ka-band radar Doppler shifts are measured for wind ripples, and corresponding phase velocities of resonant Bragg mm-scale wind ripple are shown to be between the values of phase velocities of dominant gravity wind waves and of linear (free) mm-scale waves, the ratio “free-to-bound ripple intensity” in the wind wave spectrum is estimated. The influence of surfactant films on parasitic ripple and possible ripple damping mechanisms is discussed. The work was supported by RFBR (Projects 08-05-00634, 07-05-00125), and INTAS (Project No. 8014 , “BOW”).