Estimation of Speckle noise spectrum around along-track direction by a theoretical model for SWIM configuration

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Résumé

When ocean wave spectra are to be estimated from fluctuation spectra of the normalized backscattering coefficient of the sea surface, a correction must be applied to account for speckle noise effects in the measured fluctuation spectra. Recently a theoretical model of speckle spectrum is presented considering the time-varying characteristics of the sea surface within the radar integral time. The parametric model describes how sea surface condition and radar observation geometry influence speckle spectrum. In this paper, the theoretical model is applied to the configuration of the space-borne spectrometer SWIM to estimation the speckle noise spectrum close to the along track direction. Considering the range-gate average operation of the received signal power by SWIM, the theoretical model needs to be modified slightly. Then the modified theoretical model is compared with the empirical model proposed by Hauser et al. (2020) for the validation. The results show that for each azimuth direction in along-track region, the average relative error of the speckle noise spectrum estimated by the modified theoretical model and the empirical model is less than 20%.

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