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Title: Reconstruction of Wind-Generated Wave Height Fields from Light Transmission Data

Abstract: Study of water waves (sea or ocean) has generated a great wealth of sophisticated modeling developments in applied mathematics and statistics. In this research, a two stage algorithm based on the formulation of a stochastic observational model for the raw data is established. Firstly, preliminary estimates of wave slopes are constructed from raw intensity images using a sorting/matching algorithm. Secondly, the wave height field is recovered from these slope estimates using a Weighted Penalized Least Squares (WPLS) reconstruction. The accuracy of the reconstruction is validated using simulation studies involving computer generated wave fields. The methods are illustrated by application to real data collected from IRPHE, Marseille wind wave tank facility. Finally, a study is carried out to investigate the influence of the physical factors like wind speed and fetch (the distance of waves from the source of wind) on the characteristics of wave field.