



Growth of wind-generated waves in presence of long waves

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Wind wave development in the presence of a long mechanically-generated wave was investigated in the large IRPHE wind wave tank, for different wind speeds and long wave parameters. Wind and wave observations with and without long waves were made simultaneously at various fetches and compared. At short fetches, the wind wave field observed in presence of mechanical waves exhibits a broadened dominant spectral peak shifted towards low frequencies. At large fetches, the main effect of long waves on wind wave fields consists in a noticeable damping of the dominant waves. The damping factor increases rapidly with long wave steepness ak_L at small ak_L but no longer varies at large ak_L . Moreover, this factor is strongly wind dependent, increasing first up to 6 m/s, then decreasing significantly before reaching a saturation value at high wind speeds. Consistently, the wind-generated wave fields observed in presence of long waves are characterized by much lower equilibrium dominant wave steepness. Finally, the relevant mechanisms at the origin of these phenomena and their implications for ocean wave fields are discussed.