



On the early stages of wind-wave generation under accelerated wind conditions

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When wind starts to blow, a momentum transfer initiates through the air-water interface generating ocean wave. This transfer is usually characterized in terms of the drag coefficient, C_D , but its dependency with wind speed still presents remarkable scatter in the experimental studies. Besides, Babanin and Makin (2008) found that gustiness were responsible to the most distant outliers in drag coefficient values. Also, several studies showed the influence of the sea state and wave age in the roughness and drag coefficient behavior (Smith et al. 1992; Donelan et al. 1993; Drennan 2003). Most of the past studies of wind-waves generation considered uniform and stationary wind speeds. However, in open field it is common to have conditions of wind blowing with a certain acceleration before the constant wind condition is reached. In order to study the early stages of the generation of waves under accelerated wind conditions, a total of five experiments with a characteristic wind speed acceleration were conducted in a large wind-wave facility at the Institut Pytheas (Marseille-France). Momentum fluxes were estimated from hot wire anemometry and, the free surface displacement was measured along the channel tank by resistance and capacitance wire probes. High resolution wind speed and water elevation measurements were acquired at a high resolution rate. During experiments the wind speed was increased with a constant acceleration over time, reaching a constant maximum intensity of 13 m/s. It was observed that during accelerated wind conditions, drag coefficient values depends on the degree of development of the flow regime in the air section and on wave field generation and evolution. The acceleration of wind speed has a direct influence on water surface roughness and water wave evolution in time and in space.