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Hysteresis phenomena in gravity–capillary waves on deep water generated by a moving two-dimensional/three-dimensional air-blowing/air-suction forcing[1] YEUNWOO CHO, BEOMCHAN PARK, Korea Advanced Institute of Science and Technology — Hysteresis phenomena in forced gravity–capillary waves on deep water where the minimum phase speed $c_{\min}$ =23cm/s are experimentally investigated. Four kinds of forcings are considered; 2-D/3-D air-blowing/air-suction forcings. For a still water initial condition, as the forcing speed increases from zero towards a certain target speed (U), there exists a certain critical speed (U_{crit}) at which the transition from linear to nonlinear states occurs. When $U<U_{\text{crit}}$, steady linear localized waves are observed (state I). When $U_{\text{crit}}<U<c_{\min}$, steady nonlinear localized waves including steep gravity–capillary solitary waves are observed (state II). When $U \approx c_{\min}$, periodic shedding phenomena of nonlinear localized depressions are observed (state III). When $U>c_{\min}$, steady linear non-local waves are observed (state IV). Next, with these state-II, III and IV waves as new initial conditions, as the forcing speed is decreased towards a certain target speed (U_{final}), a certain critical speed ($U_{\text{crit},2}$) is identified at which the transition from nonlinear to linear states occurs. When $U_{\text{crit},2}<U_{\text{final}}<U_{\text{crit}}$, steeper gravity–capillary solitary waves are observed. When $U_{\text{final}}<U_{\text{crit},2}$, linear state-I waves are observed. These are hysteresis phenomena which show the dependence of a state on its history starting from different initial conditions.

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