Scour at the round head of a rubble-mound breakwater. - DTU Orbit (08/10/2019)

This study complements the investigation on scour around the head of a breakwater, reported in the companion paper where the case of vertical-wall breakwater was considered. The present study deals with the case of rubble-mound breakwater. Two key mechanisms with regard to the scour processes around the round head of the breakwater are identified. One is the steady streaming occurring around the head in plan view. This generates a scour hole in front of the breakwater. The second one is the plunging breaker which occurs locally at the breakwater head. This generates a scour hole at the lee-side of the breakwater. The Keulegan-Carpenter number based on the base diameter of the breakwater head appears to be the main governing parameter regarding the streaming-induced scour, while a parameter, namely $T_p \sqrt{gH(s)/h}$, involving the peak wave period, $T_p$, the significant wave height, $H_s$, the water depth, $h$, and the acceleration due to gravity, $g$, appears to be the main governing parameter regarding the breaker-induced scour. The scour depth increases with increasing values of these parameters. The conventional stone protection is investigated in the study. An empirical formula is developed for the extent of the protection layer.