Geophysical Research Abstracts,
Vol. 11, EGU2009-106-2, 2009
EGU General Assembly 2009
© Author(s) 2008

Breaking wave impact pressures on a vertical wall

S. Sannasi A. (1) and M. S. Naik (2)

(1) Department of Ocean Engineering, Indian Institute of Technology Madras, Chennai, India (sasraj@iitm.ac.in), (2) Department of Ocean Engineering, Indian Institute of Technology Madras, Chennai, India

The growing concern for the proper utilization of the coastal zone resulted in increased efforts by researchers in understanding the coastal zone dynamics. The wall type structures are widely adopted by coastal engineers for the purpose of breakwaters and coastal protection works. These structures are designed to withstand the environmental loads due to waves, tides and currents. The interaction of these loads and their variability makes design of these structures more complex. These vertical walls are at times subjected to severe wave loads, the worst being those caused by breaking wave impact. Impact forces can be two to four times larger than the non-impact forces even though the incident wave amplitudes are comparable. Also, within the region of wave impact, pressures can be ten to fifteen times larger than the non impact pressures. Such impulse wave loads can easily lead to local fatigue problems and even local damage. It is clear that a good understanding of wave impact on structures is also important for offshore engineers.

In the present study, the imparted pressures resulting from a single plunging wave impact on a vertical wall is studied through laboratory experiments. The experiments were conducted in the 30m long current cum wave flume of the Department of Ocean Engineering, I.I.T-Madras. The flume is 2m wide and 1.0m deep. A water depth of 0.8m was adopted for the experiments. The vertical wall, of size 2m wide and 1.2m high, was fabricated using a fiber board of 10mm thickness and supported by a mild steel angle frame. Wave plunging was simulated through the frequency modulated wave packet.
The non-dimensionalized peak impact pressure, P/Cc2 has been measured in the range of 0.104 to 0.316 for various relative position of vertical wall with respect to the point of wave breaking in a narrower range, x/xb of 0.982 to 1.025, where xb is the point of wave breaking where the wave attains maximum steepness. The duration of wave impact , t / Tc ranges from 17.45 to 17.73. The maximum impact pressure was observed to occur above the still water level, z/d at 0.12 to 0.18. The duration during which the maximum impulse pressure occurred was estimated to be less than 0.01Tc .The breaking wave impact pressures were found to be 10 to 15 times more than the non-breaking wave dynamic pressures.