

عنوان مقاله:

HYDRODYNAMIC FORCE CHARACTERISTICS AND COEFFICIENTS IN THE SPLASH ZONE REGION OF
REGULAR WAVES

محل انتشار:

سومین همایش بین المللی سواحل، بنادر و سازه های دریایی (سال: 1377)

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نویسندگان:

Mohammad Reza Daliri - *Iranian Offshore Engineering and Construction Company (IOEC) No. ۵۰, Sepand St.,
Gharani Ave., Tehran ۱۵۹۸۸, Iran*

Nicholas Haritos - *Department of Civil & Environmental Engineering The University of Melbourne, Grattan St.,
Parkville, Victoria ۳۰۵۲, Australia*

خلاصه مقاله:

A comprehensive "experimental" and "analytical" study of the "overall" and "local" hydrodynamic force characteristics of both "rigid" and "compliant" surface piercing segmented cylinders with "regular" and "irregular" waves in "the splash zone" had been performed at the University of Melbourne for the last four years (Daliri, 1992-1996). Two segmented cylinders with different diameters were tested with a variety of compliance condition and natural frequencies. Conditions chosen produced variations in the test cylinder's natural frequency in the range 0.7, 2.5, 3.5, 10 and 12 Hz which was considered to be reasonably representative. This paper concentrates on a portion of this study associated with the hydrodynamic force characteristics and the respective inline force coefficients of "rigid" tests (> 0.5) under "regular" waves. "Regular" long-crested gravity and gravity waves, at frequency range between 0.2 to 2 Hz and wave steepness's (H/L) in the range 0.0005-0.1580 were synthesised. Reynolds numbers of up to 12000 were used and the KC numbers were in the range 0.5-35 which encompasses inertia force dominant ($KC < 10$) to drag force dominant conditions ($KC > 20$). Observed response signals from two wave surface elevation probes $\eta(t)$, an acoustic Doppler water particle velocimeter $u(z,t)$, the along and across wave forces from instrumented segments $f(z,t)$ in the wave run-up region, wave crest to trough region (the traditional splash zone), immediately below the splash zone and fully submerged zone plus along and across wave reactions of the cylinder's tip restraint force were simultaneously collected for subsequent analysis. In the rigid tests, the measured wave forces and the respective values of the in-line force coefficients C_D and C_M at different elevations have been obtained using the traditional form of the "Morison equation" which was modified to consider the intermittency effects at the splash - zone region. (A major focus was given on the "local" nature of the hydrodynamic force characteristics as realised in the splash zone and in the fully submerged zone immediately below this region.) In regular waves, it has been found that a correct application of the Morison equation (which is modified for the intermittency effects) in conjunction with the stream function wave theory (Fenton, 1988) can provide a reasonable description of the flow field within the crest to trough region and immediately below the splash zone. In addition, the results suggest that both C_D and C_M values in the splash zone ... region are "higher" and exhibit a mild "frequency dependence".

کلمات کلیدی:

لینک ثابت مقاله در پایگاه سیویلیکا:

