Physics > Fluid Dynamics

Resonant behaviour of an oscillating wave energy converter in a channel

E. Renzi, F. Dias

(Submitted on 10 Apr 2012)

A mathematical model is developed to study the behaviour of an oscillating wave energy converter in a channel. During recent laboratory tests in a wave tank, peaks in the hydrodynamic actions on the converter occurred at certain frequencies of the incident waves. This resonant mechanism is known to be generated by the transverse sloshing modes of the channel. Here the influence of the channel sloshing modes on the performance of the device is further investigated. Within the framework of a linear inviscid potential-flow theory, application of the Green theorem yields a hypersingular integral equation for the velocity potential in the fluid domain. The solution is found in terms of a fast-converging series of Chebyshev polynomials of the second kind. The physical behaviour of the system is then analysed, showing sensitivity of the resonant sloshing modes to the geometry of the device, that concurs in increasing the maximum efficiency. Analytical results are validated with available numerical and experimental data.

Comments:	Accepted for publication
Subjects:	**Fluid Dynamics (physics.flu-dyn)**; Mathematical Physics (math-ph)
Journal reference:	Journal of Fluid Mechanics, Volume 701, 2012, pp 482-510
Cite as:	**arXiv:1204.2164 [physics.flu-dyn]**
	(or **arXiv:1204.2164v1 [physics.flu-dyn]** for this version)

Submission history

From: Emiliano Renzi [view email]

[v1] Tue, 10 Apr 2012 14:26:14 GMT (2231kb)

Which authors of this paper are endorsers?