Mathematical Physics

Particle trajectories in linearized irrotational shallow water flows

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(Submitted on 20 Jun 2011)

We investigate the particle trajectories in an irrotational shallow water flow over a flat bed as periodic waves propagate on the water's free surface. Within the linear water wave theory, we show that there are no closed orbits for the water particles beneath the irrotational shallow water waves. Depending on the strength of underlying uniform current, we obtain that some particle trajectories are undulating path to the right or to the left, some are looping curves with a drift to the right and others are parabolic curves or curves which have only one loop.

Subjects:	**Mathematical Physics (math-ph)**
Journal reference:	Journal of Nonlinear Mathematical Physics 15 (2008), 13--27
Cite as:	**arXiv:1106.3810v1** [math-ph]

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