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Generation of surface waves by an underwater moving bottom: experiments and application to tsunami modeling[1] LEONARDO GORDILLO, TIMOTHÉE JAMIN, Matière et Systémes Complexes (MSC), Univ. Paris Diderot, GERARDO RUIZ-CHAVARRíA, Facultad de Ciencias, Universidad Nacional Autónoma de México, MICHAEL BERHANU, ERIC FALCON, Matière et Systémes Complexes (MSC), Univ. Paris Diderot — Most of the ocean waves that we observe in nature are generated by processes that take place near the ocean surface. This occurs mainly because fluid layers reduce significantly the transfer of motion between the source and the free surface as the depth increases. In any case, when the disturbances at a deep source are wide and fast enough, a wave can still be generated. The archetype of this kind of process is tsunami generation: during earthquakes, the seabed of the ocean experiences a sudden net vertical displacement that can yield waves capable of flooding entire coastlines. In this talk, we will focus on laboratory experiments concerning the generation of free surface waves in a three-dimensional uniform layer whose bottom uplifts suddenly. Based on simultaneous measurements of the free surface deformation and the velocity field, we analyze the wave generation dependence on the bottom kinematics. Our results display excellent agreement with a classical linear theory of gravity waves. In addition, we develop a new theoretical approach that can be applied to improve real-time numerical simulations used by the tsunami hazard mitigation programs.

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