

DICAM Seminar on

# Development of a new analytical model for evaluating the tank rocking motion

Tuesday, September 19th, 2017, 10:00 am

LAMC Room, Viale Risorgimento 2

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## **Abstract**

A classical discretized model, e.g. a spring-mass combined system, may represent dynamics of the flat-bottom cylindrical shell tanks clamped to the ground, i.e. the impulsive motion and the sloshing motion. In contrast, once the tanks are allowed to uplift, the classical discretized model is not sufficient to describe their entire responses, because tank uplift discontinuously appears with respect to the time of which the classical discretized model is not capable.

This seminar provides the recent development of an analytical model for evaluating the tank rocking motion by taking response discontinuity and non-inertial forces into account. To cope with that, a spring-mass-rigid-body combined system is proposed. In addition, the effective mass of fluid for the tank rocking motion and the rocking-bulging interaction is empirically predicted and analytically evaluated. A convenient but accurate closed form for evaluating the tank rocking motion is derived.

## **Short biography**

After finishing the master's course of the graduate school of the University of Tokyo in 1989, I joined Kawasaki Heavy Industries, Ltd. In the company, I designed several types and numbers of steel bridges for three years and improved both design and construction methods of the cryogenic tanks and piping systems for ten years. I joined the faculty member of Tottori University in 2001 as Associate Professor and promoted to Professor in 2010. My research interests are the development of; 1) an analytical model of the tank rocking motion, 2) the approximation procedure of the elasto-plastic response based on the linear response spectrum, 3) detection method of defects in the structures, etc.