# A Program to Determine Impact Forces from Tsunami-Driven Debris

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Debris carried by tsunamis rushing on-shore can impact critical structures, such as evacuation shelters, port facilities, and fuel storage tanks. The debris impact forces are not well understood, and current design procedures for debris forces are based on inadequate rigid body impact dynamics. The goal of the research is to transform our understanding of and our ability to predict high mass, low velocity, tsunami-borne debris impact forces on structures. In addition to woody debris, of special interest are shipping containers, which are ubiquitous, are commonly dislodged during tsunami events, and can float even when fully loaded.

First, we will discuss related findings from post-tsunami damage surveys and some preliminary experimental and numerical work on tsunami-driven debris impact. We will then discuss plans to carry out experiments to improve our understanding of low speed impact of heavy debris and to develop and validate numerical models for their prediction. We intend to develop a simplified impact model that can be used for design, and a more complex fluid-structure interaction model based on computational fluid dynamics. This simulation-based model will allow us to explore complex parameters not included in the simple model and to consider scenarios not covered by experiments.