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DESIGN AND CONSTRUCTION OF LAMINAR BOX FOR GEOTECHNICAL CENTRIFUGE AT UNIVERSITY OF TEHRAN

Sina GOLMOHAMADI
Ph.D. Candidate, School of Civil Engineering, College of Engineering, University of Tehran, Tehran, Iran
golmohamadi@ut.ac.ir
Amir MAGHSOODI SHAGHAGHI
M.Sc. Candidate, School of Civil Engineering, College of Engineering, University of Tehran, Tehran, Iran
amir.maghsoodi94@ut.ac.ir
Abbas GHALANDARZAEH
Associate Professor, School of Civil Engineering, College of Engineering, University of Tehran, Tehran, Iran
aghaland@ut.ac.ir

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Nowadays, physical modelling has become one of the low cost and helpful methods to study the characterization of phenomena. As a branch of civil engineering, geotechnics concerned with the engineering behaviour of earth materials. In order to simulate different geotechnical phenomena at laboratory, various types of container are available. Simulating dynamic response of geotechnical models can be achieved by laminar box that can minimize the boundary effects.

The main source of earthquake-induced soil failure caused by an elastic shear wave begins to spread from the lower layers of the ground that is hard. As the shear wave propagate to shallower layers, the principle stress direction changes through it (Zayed et al., 2017). Ideally, if shear wave propagation assumed to be vertical, the stresses on the soil element will be like Figure 1. In order to model a phenomenon and extend it to real conditions, the effects of boundary conditions must be properly modelled and considered. In order to model a phenomenon adequately, the effects of boundary conditions must be properly modelled and considered (Zeng and Schofield, 1996).

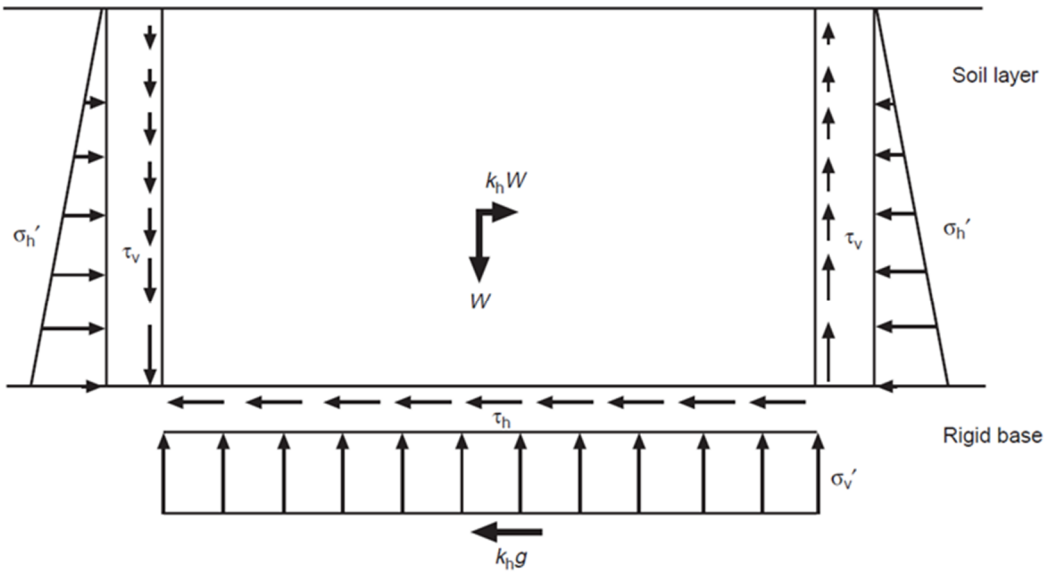

Figure 1. Soil stress field in smooth container.

In order to study dynamical response of geotechnical models, new laminar box was designed and constructed for geotechnical centrifuge model at university of Tehran. For this purpose, aluminium laminates were mounted on an external frame and separated with roller bearing. The main criteria for designing of laminar container were low friction between laminates and low mass of total container. Hence different combination of roller bearing arrangement was examined to achieve this goal. Figure 2 shows schematic components and dimensions of the laminar box.

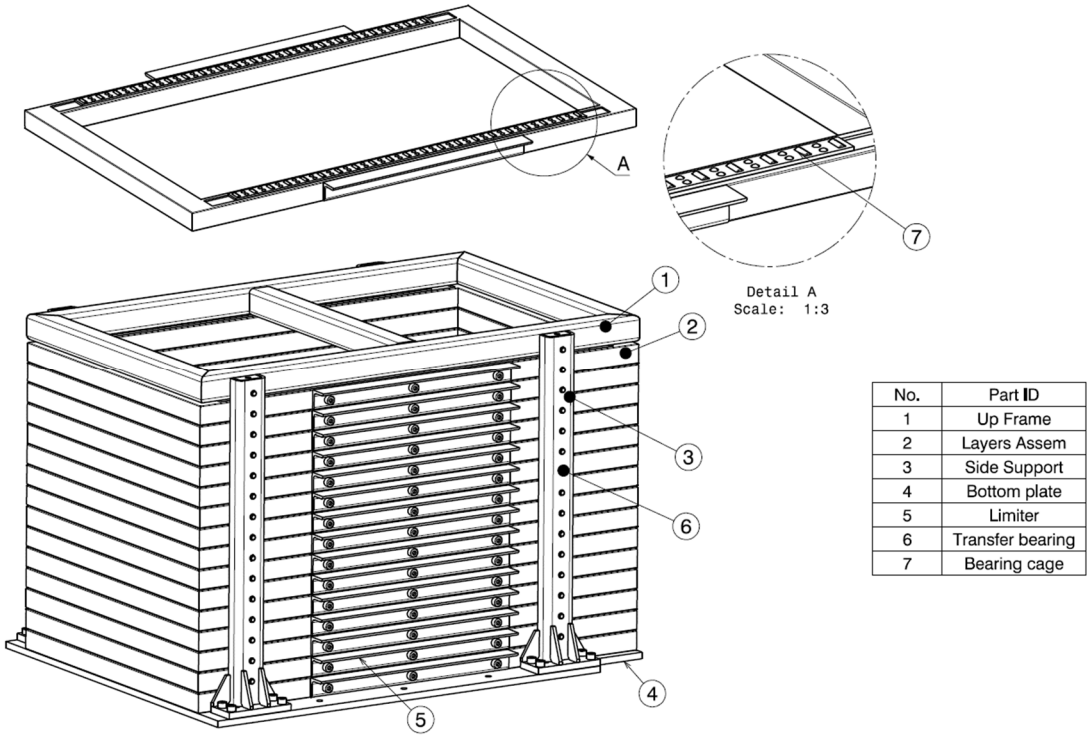

Figure 2. Schematic components and dimensions of the laminar box.

To calibrate the laminar box two types of tests conducted under vertical load actuator and also in the centrifuge. Results show that the friction forces between laminates were relatively accepted. In order to evaluate the static and dynamic response of soil at high level acceleration, a series of tests on saturated sand were performed. Results confirm that earthquake simulation in laminar box has satisfactory performance for saturated sand.

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