



DFG Résines project

Dynamic SSI studies and stability verification under earthquake loading

2020



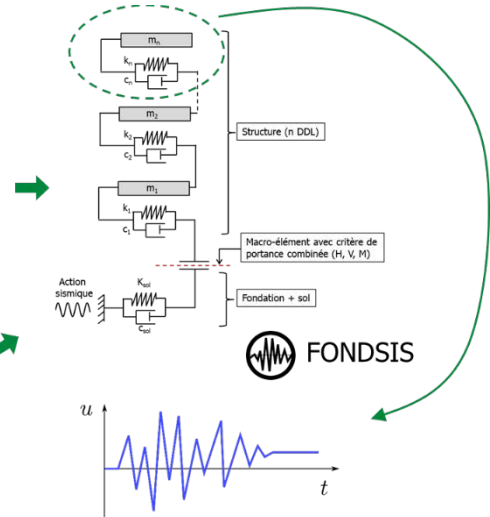
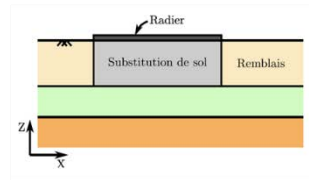
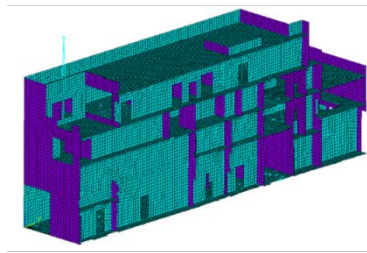
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Terrasol's services fees
20 k€

Highlights

- Nonlinear SSI with macroelement (Fondsis)
- Stability under SND earthquake
- Soil substitution



The Project

As part of the preliminary design studies for the DFG Résines building, located in the La Hague nuclear waste processing plant, an analysis of its robustness under earthquake loading is requested.

The DFG Résines building is a reinforced concrete structure of rectangular shape and dimensions 14 m by 49 m. It is founded on a general raft resting on a soil substitution made of concrete down to the bedrock halfspace.

Key features

- Explicit modeling of a localized ground substitution in the dynamic impedance calculations necessary for SSI (soil-structure interaction) studies
- Analysis of the seismic stability of building by a displacement approach (hybrid model on SSI macroelement)
- Consideration of nonlinear SSI phenomena (sliding and uplift)

Our Services

Terrasol's mission: to evaluate the dynamic impedance functions necessary for the seismic calculations of the structure and to verify its stability under SND earthquake using a displacement approach.

The dynamic impedance functions were established using a hybrid SASSI2010 model with an explicit modeling of the soil substitution by means of volume elements. In parallel, a study of the impact of the soil substitution modeling in the calculation of impedance functions was carried out. It was found that a possible modeling of the soil substitution as a horizontal layer (of implicitly infinite width) generated an exaggerated high apparent bending/shear stiffness of the foundation.

The verification of the seismic stability of the building was performed using FONDSIS software, developed at Terrasol for the treatment of nonlinear dynamic soil-structure interaction (SSI) problems. A parametric study was carried out with, among other things, an increase of the loading amplitude and a decrease of the resistance properties, which allowed to give an unambiguous conclusion on the stability of the structure.

