



## Seismic Analysis of Structures

EASL provide clients with a comprehensive and bespoke service taking ownership of the problem to provide, efficient, clear and cost-effective solutions. Seismic analysis, alongside seismic assessment, design and walkdown, make up a series of seismic services our highly trained specialised can deliver.

With expertise in seismic engineering and an array of other structural integrity analysis services, EASL can not only assess seismic factors but also take into account and analyse the potential threat and risks surrounding such concerns, allowing for a great level of clarity for our clients.

### What is Seismic Analysis?

Seismic analysis is a subset of structural analysis and calculates the response of structures, systems and components (SSCs) to earthquakes. It is part of earthquake engineering that designs and analyses SSCs, such as buildings, pressure vessels and cranes, to demonstrate their operability, integrity and stability, to earthquakes. For safety-related nuclear SSCs, seismic analysis is often an essential part of nuclear safety case.

Whether it's the civil nuclear, oil, gas, defence or power generation industries, seismic input can play a significant role in the strain put on the respective SSCs involved. Analysing these risks ensures that clear information is available to determine the best preventative action.

### EASL's Seismic Analysis Services

We have extensive seismic analysis expertise and experience in calculating seismic response of a wide range of SSCs for seismic design, substantiation or nuclear safety case. Supported by hand calculations and/or finite element modelling and analysis tools, the areas covered by our seismic analysis service includes:

- Evaluation of design basis earthquake and seismic margin earthquake response spectra for the intended assessment
- Seismic analysis of civil structures to generate secondary response spectrum at floor levels for subsequent seismic assessment/qualification of systems and components mounted off the ground level
- Seismic analysis of civil structures to provide seismic demands (forces, moments and displacements) for their design basis seismic assessment
- Seismic analysis of systems and components to provide seismic demands (forces, moments, displacements, stresses, strains) for their design basis seismic assessments
- Beyond design basis seismic analysis for seismic margin assessment
- Where necessary, the effects of nonlinearities, such as local yielding, sliding and uplifting can be included
- Commercial finite element modelling/analysis and piping analysis/assessment packages include ABAQUS, ANSYS, PSA5 and ADLPipe
- Independent technical review

We keep our service at the forefront of seismic analysis technology by implementing (where necessary) the latest recommendations from the leading institutions, such as ONR (UK regulator), USNRC (US regulator), ASCE, EPRI, IEEE and ASME.

We take a pragmatic approach in the selection of a suitable route in seismic analysis leading to the most cost-effective solutions that will satisfy the assessment goal or safety case requirements. To satisfy challenging analysis demands, if and when necessary, we are capable of method development beyond the general capability of commercially available analysis tools.

For seismic design, early engagement with seismic evaluation could lead to significant cost reductions. Our seismic analysis and assessment expertise will allow us to make valuable early seismic evaluation in a design process leading to the formation of a cost effective seismic design strategy.



One latest development in seismic assessment is the expectation of feeding seismic margin assessment into PSA (probabilistic safety assessment). As part of our seismic analysis service, EASL provide probabilistic fragility studies of SSCs which can be used in a seismic PSA to inform the overall seismic risk.

EASL has a highly specialised team of engineers and scientists ranging from entry level graduates through to PhD, offering a wealth of knowledge to our clients and projects. With an expertise in all aspects of seismic evaluation, we can deliver a comprehensive, bespoke range of services to our clients offering a cost-effective and trustworthy insight through our breadth of experience.

To find out about our related seismic services, take a look at our relevant services below, or if you have any specific questions regarding our seismic analysis services, or get in touch on [enquiries@easl-stress.co.uk](mailto:enquiries@easl-stress.co.uk).

#### Related Services

- Hazards
- Seismic Assessment
- Seismic Design