MSc thesis proposal

❖ Title of the research

Uncertainty quantification methods in the risk analysis of energy systems exposed to NaTech hazards and accident scenarios

❖ Objectives of the research

The purpose of the research is to develop methods of uncertainty quantification for a quantitative risk analysis of NaTech (Natural-hazard triggered Technological accidents). In particular, methods will be developed for scenarios generation in energy systems, aimed at:

i) the characterization and mathematical representation of the uncertainties affecting the NaTech scenarios triggered by earthquakes, tsunami, and/or floods on energy systems;
ii) applying inverse uncertainty quantification processes in combination with expert engineering judgment to specify the nominal values, probability density functions and upper bounds of the uncertain input parameters of the simulation code;
iii) handling the propagation of both aleatory and epistemic uncertainties in the risk model, with the integration of probabilistic and non-probabilistic uncertainty analysis methods;
iv) identifying the model parameters most affecting the risk outcomes.

The project activities will be performed in "Laboratorio di Analisi di Segnale e Analisi di Rischio" (Signal and Risk Analysis Laboratory, LASAR, www.lasar.polimi.it) of the Department of Energy of Politecnico di Milano, in collaboration with Istituto Nazionale di Geofisica e Vulcanologia (INGV).

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