

SUMMARY OF HABILITATION THESIS

This habilitation thesis presents the main scientific, professional and academic achievements of the author, following the defense of the PhD thesis in 1996 at the Technical University of Civil Engineering Bucharest, as well as the career evolution and development plan.

After a short summary (Part A of the thesis), Part B presents a brief synthesis of the achievements of the author for the considered period, including references to her career evolution, research projects and authored publications (Chapter B(I)1), a list of the most relevant publications (Chapter B(I)2) and a detailed presentation of the outcomes of the author's scientific research, grouped around the main directions of study (Chapter B(I)1.3). The content of this last chapter is summarized in the following.

Section B(I)3.1, ***Mapping of the spatial variation of seismic demands induced by strong Vrancea earthquakes***, presents results from an in-depth analysis of the maps of inelastic strength and displacement demands, developed by the author for strong ($M > 6$) earthquakes occurring in the most active seismogenic area in Romania. The analysis allowed discerning the influence of nonlinear response on the spatial variation of seismic demands and observing its correlations with the spatial distributions of other significant parameters, as peak ground motion parameters and parameters related to the spectral content.

Section B(I)3.2, ***New analytical approaches in the evaluation of seismic damage and seismic performance***, encompasses a series of studies performed over several years, starting with the development by the author of the first damage spectra and damage maps for strong Vrancea earthquakes occurring in Romania in the last four decades. Damage was first expressed based on the Park-Ang index and on other related indices. In a complementary approach, strength demands associated to constant damage levels were also computed and mapped. Results were compared to the actual damage recorded in buildings after the considered earthquakes. Using a methodology developed by the author, strength reserves mobilized by various building typologies during the earthquake were evaluated. In a subsequent approach, the instrumental intensity was mapped, for the same earthquakes. In correlation with the EMS-98 macroseismic intensity scale, this parameter was used to estimate seismic damage in buildings, with validation based on actual damage reports.

Section B(I)3.3), ***Ground motion characterization***, presents results from an extensive study (in progress) performed on over 300 accelerograms from the strong Vrancea earthquakes of 1977, 1986 and 1990. For these, a database was created, with values of several deterministic and stochastic indices related to ground motion frequency content. Analytical estimators, such as those based on Fourier spectra, power spectral density,

response spectra and peak ground motion values were evaluated and compared. Results were correlated and validated using information provided by various spectral bandwidth measures. Subsequently, the spatial and temporal distribution of the period-type parameters from the set described above was represented and analyzed, drawing up conclusions on their variability both with site conditions and seismic events. Detailed comparisons with experimental data were performed for the city of Bucharest. In the same section, results from other related studies are presented.

Section B(I)3.4, ***New developments in the evaluation of seismic strength and displacement*** demands, represents the continuation of some studies initiated by the author in her PhD thesis. The research, using nonlinear response spectra computed for strong Vrancea earthquakes, were focused on seismic strength and displacement demands, as well as on strength reduction factors. Given that these topics are still of actuality, the aim was the refinement of previous results and their updating to the actual scientific knowledge. The research topics concern the investigation of factors influencing seismic strength demands, as well as the improved evaluation of strength reduction factors and of displacement modification factors.

Section B(I)3.5, ***Seismic hazard and risk assessment***, describes research performed by the author within the project ROSERIS. This was aimed at the development of a complex software tool, capable of assessing the seismic risk of buildings in Romania and to display the results in the form of maps and reports. Within this section, other recent contributions of the author in the field of seismic risk assessment, in the URBASRISK and RO-RISK projects, are also mentioned.

Section B(I)3.6, ***Modern educational tools for seismic design, earthquake preparedness and natural hazards mitigation***, encompasses outcomes from three distinct projects, in which the author was director or partner responsible. All the projects have in common the education of various categories of population or structural engineering professionals to cope with the challenges of living or practicing in a seismic country. The INFORISX project aimed at the development of a web platform for citizens' information and preparedness against earthquake effects. The E-PreS project, funded by the European Commission, was carried out by the National and Kapodistrian University of Athens, with five organizations from Romania, Greece, Italy and Bulgaria as partners. The project created and implemented a complex software and hardware platform for the monitoring and evaluation of seismic preparedness in school environment. The SEISMOCODE project, now in progress, concerns the development of an online lifelong learning platform, aimed to facilitate adaptation of Romanian civil engineers to the harmonization of national seismic design prescriptions with European standards.

Section B(II) presents the career evolution and development plans of the author, from the scientific, professional and academic perspectives.

Section B(III) contains bibliographic references.