

UNIVERSITATEA TEHNICĂ DE CONSTRUCȚII BUCUREȘTI

TEZA DE ABILITARE

Aspecte legate de evaluarea hazardului și riscului seismic
cu aplicații pentru România

Domeniul de doctorat: Inginerie Civilă și Instalații

Conf. univ. dr. ing. Florin PAVEL

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Abstract

The habilitation thesis entitled “Aspects Related to Seismic Hazard and Risk Assessment with Applications for Romania” presents the scientific, teaching, and professional activities carried out by the author after completing his doctoral studies at the Technical University of Civil Engineering Bucharest (UTCB) in 2012, under the supervision of Prof. Dan Lungu.

The research activity is closely linked to the scientific projects and research contracts in which the author was involved either as project director/project coordinator or as a member of the research team. In this context, noteworthy research projects and contracts include BIGSEES (PN-II-PT-PCCA-2011-3.2-0788), RO-RISK (SIPOCA 30), and COBPEE (PN-II-RU-TE-2014-4-0697), within which various aspects related to seismic hazard and risk assessment for Romania, and particularly for the city of Bucharest, were investigated. In these projects, UTCB acted either as coordinator or partner, while funding was provided through both European funds and national research programmes.

The main scientific contributions of the author presented in the thesis are related to the analysis and simulation of ground motions generated by Vrancea intermediate-depth earthquakes, the development and application of empirical models for seismic action characterization, probabilistic seismic hazard assessment for Romania and the city of Bucharest, the analysis of local site amplification effects, the evaluation of seismic fragility, vulnerability, and risk of buildings and critical infrastructure, as well as the investigation of the impact of historical earthquakes on seismic design practice. Part of the research outcomes has been used in updating seismic hazard models for Romania and has contributed to the development of recent technical regulations in the field of seismic design.

The thesis also presents the teaching activity carried out at UTCB since 2012, including courses delivered within undergraduate and master's degree programmes, educational materials developed in Romanian and English, as well as the supervision of bachelor's and master's theses. The contributions related to the integration of research outcomes into the educational process and the development of courses in earthquake engineering, structural reliability, and risk assessment are also highlighted.

The professional activity, initiated in 2008, is also summarized. It includes structural design activities, seismic hazard and risk assessments for projects of national interest, participation in the development of building codes and technical regulations, as well as administrative responsibilities within the university. During the period 2022–2026, the author developed a professional collaboration with Saidel Engineering aimed at improving monopile foundation systems. During the period 2020–2022, the author served as Vice-Dean of the Faculty of Engineering in Foreign Languages at UTCB.

The thesis is structured into six chapters. The first chapter contains the summary in Romanian and English. The second chapter represents the introduction, providing a brief overview of the professional, teaching, and research activities. The third chapter details these three main directions – scientific, teaching, and professional. It also presents the research projects in which the author has been involved since completing his doctoral studies, as well as the main research directions pursued during the period 2012–2026. Relevant results are highlighted through papers published in ISI-indexed journals with impact factors and in the proceedings of national and international conferences; this chapter also includes a list of the author's ten most representative publications. Other important contributions—research impact, awards, participation in research projects, reviewer activity for indexed journals, and involvement in the organization of scientific events—are presented in a dedicated subsection.

The teaching activity is described through the courses and seminars delivered within the Faculty of Civil, Industrial and Agricultural Engineering and the Faculty of Engineering in Foreign Languages, from 2013 to the present, together with the educational materials published in collaboration with colleagues from UTCB. The professional activity carried out during the period 2008–2026 is presented in the same section, including structural design practice, development of design codes, and administrative responsibilities within the university.

The fifth chapter describes the career development plan, structured along scientific, teaching, and professional directions, with particular emphasis on doctoral supervision activities. The conclusions of the thesis are presented in the sixth chapter. The list of references, together with the lists of figures and tables, is provided at the end of the thesis.