OVIDIUS UNIVERSITY OF CONSTANTA

HABILITATION THESIS

Hydraulic of pressure systems functioning in unsteady regime.
Coastal hydrodynamics and litoral processes

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ABSTRACT

The candidate began, in October 1993, her educational activity and scientific research at the "Ovidius" University of Constanta, Faculty of Engineering, Department of Civil Engineering, occupying the following positions: assistant (1996), lecturer (2000), Associate Professor (2005) and Professor (2016).

Graduate of two faculties, the Faculty of Hydrotechnical, Institute of Civil Engineering Bucharest (1993) and the Faculty of Mathematics and Computer Science, Ovidius University of Constanta (2002), the candidate held, in December 2002, the doctoral thesis entitled "Contributions to the calculation of pressure hydraulic systems, operating in non-permanent state", under the scientific supervision of Prof. dr. ing. Arsenie Ion Dumitru.

The PhD thesis contains the theoretical and experimental research, less presented in the specialty literature, concerning the pipes with variable section (truncated cone pipes) and the pipelines with flow distribution: the relationships for drawing of the energy and the piezometric lines for the water flow in the truncated cone pipes or in the uniformly distributed pipelines, operating in steady state; Jukovski relationship, the speed and the fundamental equations for the hydraulic shock phenomenon in the truncated cone pipes or in the uniformly distributed pipelines. The research results presented in the PhD thesis were published in the national and international conferences volumes and in national journals.

The present habilitation thesis includes the main results of the scientific research in the Civil Engineering domain, obtained after conferring the Ph.D. title, in the period January 2003 - March 2017. These researches were realized in the Faculty of Civil Engineering, "Ovidius" University of Constanta, where the candidate works from 24 years.

The habilitation thesis, developed after 15 years of supporting the PhD thesis, is divided into three parts: the first part presents the main scientific, academic and professional achievements after doctoral thesis; the second part presents the proposal for academic career development and the third part contains the references.

The post-doctorate work was carried out in two main directions:

- During 2003-2011 - Research on non-permanent flow of water in pressure hydraulic systems summarized in section 1.2.

- During 2011-2016 - Research on the free surface water movement in non-permanent state, focused on the hydrodynamics and coastal processes of the Romanian seaside, presented in section 1.3.

Concerning the first research direction, continuing the main topic approached in the PhD thesis, the candidate has obtained in 2009 a research grant by national competition, *The mathematical modeling and numerical simulation of the hydraulic shock phenomenon (water hammer) in pressure systems of water supplies equipped with protection means,* funded by "Executive Agency for Higher Education, Research, Development and Innovation Funding".

In this grant, the research presented in Chapter 1, Subchapter 1.2, was related to:

- The development of the original theoretical studies and the mathematical modeling with numerical methods of the shock hydraulic phenomenon in pressure hydraulic systems, provided with further protection means. Two unconventional processes were studied: one method consisting of making a deformable protection along the length of pipes and another method in which is achieved one or more parts with different properties from those of the protected pipe.

- The achievement of a computer program for performing the non-permanent movements and based on this program to perform the numerical simulation for the studied cases.

The candidate's concern for the second research direction began with the establishment the Master's degree program "Coastal Engineering". On this line, in 2008 was published the book "The sea waves hydraulics", to which the candidate is co-author.

In 2012, at the national competition PN II_Partnership, funded by " Executive Agency for Higher Education, Research, Development and Innovation Funding ", the candidate was awarded the grant PN-II-PT-PCCA-2011-3 (ECOMAGIS) "*Implementation of a complex Geographic Information System for ecosystem-based management through integrated monitoring and assessment of the biocoenosis status and Its evolution trends in the fast changing environment at the Romanian coastal zone of the Black Sea*", the coordinator being The National Institute for Marine Research and Development "Grigore Antipa" Constanta.

At this research grant the candidate was project responsible from the Faculty of Civil Engineering part. The research grant, which ended in 2016, had the following objectives:

- Development of an integrated operational informational system to be provided by the hydro-bio-geo-morphological data recorded in the coastal zone;

- Evaluations, forecasts and warnings about the ecological state of the coastal zone in the pilot areas, based on remote monitoring / automated;

- distributing the information and forecasted data to the important bodies and / or stakeholders in the coastal area;

- Creation of a web portal, containing all data and informations relevant for the local and regional stakeholders.

The results obtained in this grant are presented in Chapter 1, section 1.2 and includes research on:

- Coastal erosion;

- Coastal pollution;

- Aspects of hydro - geomorphic process modeling with impact on the evolution of the Romanian coastal zone ecosystem, in the new context of climate change;

- monitoring the coastal zone.

The results of the scientific research have materialized in the publication of over 70 scientific papers in ISI journals and volumes of scientific events, in the country and abroad, indexed ISI and BDI (15 ISI or ISI Proceedings and 21 articles BDI). The candidate's research activity was realized including the publication of some books in the hydraulics field, as the author or coauthor.

The candidate's educational activities is related to the research topics covered by this habilitation thesis, in the 24 years, sustaining courses and seminars at Bachelor and Master programs: "Fluid mechanics and hydraulics", " Constructions hydraulic ", "Hydrogeology and underground hydraulics " at the Bachelor programs," Coastal hydrodynamics ","Coastal Processes", ”Applied hydrogeology", ”Applications of hydraulics in hydrotechnical systems"," Pollutants Transport "," The rivers water quality modeling" at the Master programs.

By candidate's involving in the national and international research grants, as grant manager or member in the research team, she has acquired the project management skills.

Concerning the further development of the career, the candidate aims to establish a research team at the “Ovidius” University focused on the two presented research directions, the potential doctoral students being recruited mainly from the Master programs from the Faculty of Civil Engineering.

The candidate intends to continue the research on transient hydraulic systems, one theme is the experimental validation of the two unconventional methods studied and presented in section 1.2. The candidate also will continue the research activity on the coastal processes, with the following subjects:

• Determination of the shoreline changes and evolution trends on the geomorphological components of the coastal zone;

• Parameterization of the environmental conditions, waves, sea level and currents in the shallow zone to modeling coastal process purposes;

• Quantification the causes and the risk assessment;

• Identification and substantiation of the measures, methods and technologies for the protection and rehabilitation of the coastal zone;

• Implement the rehabilitation solutions of the coastal areas and the impact monitoring of these solutions.

To achieve the further research studies, the candidate will continue to work with the researchers' team of the Institute of Marine Research and Development "Grigore Antipa" Constanta.