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## On the *Pusan National University*, Busan, Korea

This paper brings a short overview of the *Pusan National University (PNU)*, with special emphasis on the Department of Naval Architecture and Ocean Engineering, and is motivated by the one-month research visit of the first author (Nikola Vladimir) to *PNU* from January till February 2013, which was organized by the *Global Core Research Centre for Ships and Offshore Plants (GCRC-SOP)*.

nature friendly environment on the south-eastern tip of the Korean Peninsula.

Although the *Pusan National University* initially started with only 2 faculties (Faculty of Humanities and Faculty of Fisheries), now it comprises 15 colleges, one independent division, a general graduate school, 5 professional graduate schools and 6 special graduate schools, and covers all the major disci-

### O sveučilištu *PNU*, Busan, Koreja

U članku je dan kratki prikaz južnokorejskog sveučilišta *Pusan National University (PNU)*, s naglaskom na aktivnosti Zavoda za brodogradnju i pomorsku tehniku *PNU*. Prikaz je motiviran jednomjesečnim znanstvenim boravkom prvog autora na *PNU*, organiziranim preko *Global Core Research Center for Ships and Offshore Plants (GCRC-SOP)*.

Sveučilište *Pusan National University* osnovano je u svibnju 1946. godine i nalazi se u Busanu, drugom po veličini gradu u Južnoj Koreji, i trenutno uživa reputaciju jednog od najboljih korejskih sveučilišta. U sastavu *PNU* trenutno djeluje 15 fakulteta, koje pohađa oko 25000 studenata, a sveučilište trenutno zapošljava oko 2700 djelatnika. Rad sveučilišta organiziran je u četiri dislocirana kampusa (Geumjeong-gu, Ami-dong, Yang-san, Mil-yang).

Zavod za brodogradnju i pomorsku tehniku *PNU* osnovan je 1950. godine, a pod današnjim imenom i trenutnom organizacijskom strukturom funkcionira od 2003. godine. Zavod godišnje upisuje osamdesetak studenata čija stopa zapošljavanja nakon studija je izrazito velika, prvenstveno zbog naglašenih potreba korejske brodograđevne industrije ali i zemljopisnog položaja sveučilišta, koje se nalazi 50-ak km od najvećih korejskih (ali i najvećeg svjetskog) brodogradilišta. Istraživačka djelatnost Zavoda organizirana je kroz rad 10 laboratorija koji se odlikuju izvanrednom opremljenošću, osobito u području brodske hidrodinamike, dinamike brodskih i pomorskih konstrukcija, analize vibracija i buke itd.



The authors with their colleagues at the *PNU*

The *Pusan National University* is South Korean university established in May 1946 (first as a 2-year college and in 1953 as a 4-year university) by the National Government in Busan, which is the second largest city in South Korea. It is located at the foot of Geumjeongsan Mountain in a

plines within the academia. Moreover, the *PNU* enjoys its reputation as one of the top universities in Korea. Within the *PNU* there are 106 research institutes in total, a library and 39 supporting facilities as well as 8 corporate and other organizations. Up to the year 2010 the University had about 180000 alumni (140460 bachelor's degree holders, 34338 master's degree holders, and 6058 doctoral scholars), and the current number of enrolled students is about 25 thousands. There are about 1900 professors (full, endowed, emeriti etc.), together with ca. 600 administrative staff members and some 200 teaching assistants. The *PNU* has 4 campuses. The main campus is at the foot of Geumjeongsan

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Snapshot from sightseeing

Mountain and most colleges and departments are located there. Other campuses have special objectives and are dislocated from the main one. The campus located in Ami-dong, Busan, is for the department of dentistry, and the campus in the Yang-san city (other city) is specialized for medical sciences. Within this campus there is the *Pusan National University* hospital. The last one, the Mil-yang city (also another city) campus is specialized for nano- and bio-technology.

When describing the *PNU*, it is necessary to mention the *PNU* library and the *PNU* museum. The Pusan National University Library was established in the same year as the university, and now it operates seven subject libraries; the Humanities and Social Science Library, the Language and Literature Library, the Science and Engineering Library, the Arts and Athletics Library, the Law Library, the Medical Library, and the Nano & Life Science Library. As of October 2008, the Library has a collection consisting of more than 2.1 million books, more than 40000 types of periodicals, and more than 10000 e-books. The Library also operates numerous specialized data

rooms, including the Classics Archives, the Multimedia Centre, the North Korean Data Centre, the UN/EU Information Centre, and the Data Centre for International Education Programs, and the Window on America. The *PNU* museum is a two story building that displays various artefacts from the Palaeolithic age to the Joseon Dynasty period. It was established with the purpose of contributing to academic research and social education, as well as to the development of local culture. Besides its help to students and general public in appreciating ancient and traditional Korean cultures, the *PNU* museum continuously conducts surveys and excavations of the cultural properties in Busan and Gyeongsangnam-do as a research institution of ancient cultures.

The Department of Naval Architecture and Ocean Engineering at the *PNU* belongs to the College of Engineering, which is actually a very large organization unit – it has about 10000 students, 230 faculty members, and 57 research, education, and industry-academia cooperation centres. The purpose of the college is to produce core human resources required by backbone industries of Korea, such as machinery, shipbuilding, and semiconductors.

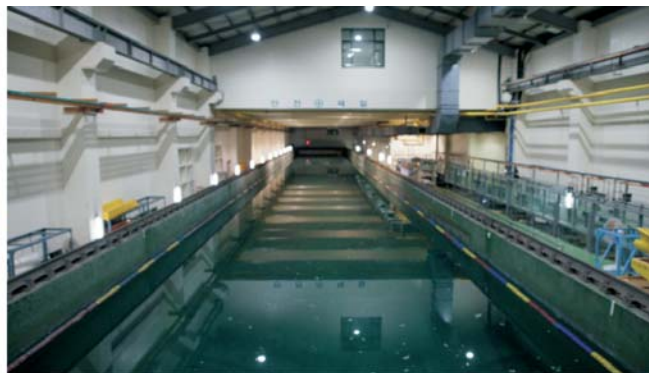
The Department of Naval Architecture and Ocean Engineering was established in 1950 as the Department of Shipbuilding Engineering within the *National Fis-*

*heries University of Pusan*, and transferred in 1964 to the *PNU*. During the past this department had different names and organizational structure, and since 2003 it exists in its present form. The Department of Naval Architecture and Ocean Engineering covers a wide range of subjects associated with ships and offshore structures, and because its location (within 50 km distance from about 90% shipyards of Korea) the Department is able to play a role as the local core in the industrial technology development. Currently, within the department there are 10 laboratories with a wide range of test facilities:

- Ship Welding Strength Laboratory
- Ship Basic Design
- Ocean Engineering
- Structural Mechanics
- Ship Motion and Manoeuvring
- Ship Resistance
- Ship Vibration and Noise
- Propulsion System
- Continuum Damage Mechanics
- Simulation Innovation (CFD).

Among the wide range of test facilities in the department, it is necessary to mention the towing tank (with towing carrier and wave maker) having dimensions 100x8x3.5 m, where ordinary towing tank tests such as ship resistance, propulsion, manoeuvring, ship and offshore structure motion, etc. are being conducted. There are two types of circulating water tanks. The larger one, with the observation section dimensions 5x1.2x1.8 m and the water range velocities from 0 to 2.0 m/s, is used for different research related to conventional merchant ships, while the smaller one is used to investigate high speed flow around small specimens. The water velocities in the former one are up to 25 m/s. The purpose of the 6-DOF (degrees of freedom) motion platform is

#### *PNU* towing tank







The 6-DOF motion platform with sloshing test facility

to investigate the inner flow of the water tanks and this facility is mainly used to research the behaviour of the LNGC tanks. Furthermore, there are a drop test facility and a slamming test facility (with the maximum drop height up to 4.3 m) which are used to perform wet drop experiments. A cryogenic chamber is used to investigate the characteristics of the material in extremely low temperatures. The department is also equipped with a fire test facility, an explosion test facility, a high speed impact load test facility, etc. There is also aim to install a subsea high pressure test facility in 2014, with a particular goal to perform all kind of experiments related to offshore engineering.

Each year 80 students enrol the Department of NAOE. About 40 percent of them receive the scholarship from the government or industry. The employment rate has been more than 90 percent for the last several years and recently close to 95 percent.

high quality floating vessels and offshore structures, while the LRET is particularly oriented to nonlinear loading and structural response of the offshore structures.

Although it would be very interesting to compare the Department of Naval Architecture and Ocean Engineering with similar organization units in Croatia, due to different economic, technical as well as social reasons in the authors' opinion this seems not to be possible. However, the authors strongly believe, bearing in mind the current position of Korean research and ship-building industry as

There are two main research centres within the Department of NAOE. The first one is GCRC-SOP supported by the National Research Foundation of Korea (NRF), and the second one is LRET (Lloyd's Register Education Trust). The main objective of the GCRC-SOP is to develop technology for

well as the Croatian tradition and long-term experience in the field, that collaboration of such institutions is very important and useful for the involved parties.

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Beomeosa Temple snapshot



Slamming model experiment preparation and performing

