

**Proposed dissertation theme for the Doctoral degree Studies (2018-2022) in  
Ecology and Environmental Science at Klaipėda University**

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| <b>Title</b>  | <b>Hazardous oscillations in the Klaipėda harbour: observations and modeling</b>  |
| <b>Brief description of the topic</b>               | <p>The most dangerous situations in semi-enclosed water bodies and harbours mainly occur due the unexpected and rapid water level changes. Such situations are often induced by the impact of long waves (<math>T=25-300</math> s known as infragravity waves) or by resonance of the water motions in small basins such as harbours or marinas excited by shorter waves. The resulting water level fluctuations and extensive seiches can cause excessive movements of vessels, compromise harbour operations, create danger to vessels, harbour constructions and in extreme cases even loss of lives. One of the possible origins for unexpected fluctuations in water level is hazardous meteorological phenomena such as atmospheric pressure changes, wind set up, storm surges, waves and etc. Location of the Klaipėda harbour take in infragravity period oscillations generated in the Baltic sea and/or in the Curonian lagoon.</p> <p>The main objective of this project is to identify potential causing mechanisms of infragravity period oscillations in a Klaipėda harbour and to find out efficient ways to minimise the oscillation problem. To achieve the main objective it is expected to fulfil the following tasks: to identify the dominant periods of seiches within the harbour through field measurements and the harbour response to different incident offshore and lagoon wave conditions; to apply of a numerical model, validated using field measurements, to identify sources of infragravity wave generation in the offshore under different incident wave conditions, to identify natural oscillation periods (NOPs) of the Klaipėda harbour and Curonian lagoon, and investigate the influence of harbour geometry on oscillation patterns. This knowledge will allow to recommend idealised different harbour layouts and develop a set of key parameters to minimise seiching.</p> <p>The findings of the study are important in understanding the infragravity period oscillations in complex geometry harbours located in the transitional water bodies, and in estimating preliminary dimensions for a new harbour to minimize the oscillation problem.</p> |
| <b>Requirements for a candidate</b>                 | We are seeking motivated and qualified students who wish to make a PhD within the field of Ecology and Environmental Science. Students with background in theoretical or applied sciences (ecology, geography, physics, mathematics, informatics, environmental engineering) are encouraged to apply.   |
| <b>Research experience in the institution</b>       | The candidate will join international Lithuania-Estonia-Italian team which has experience in the field of the wave dynamics, field measurements and mathematical modelling. A number of publications derived from the output of international projects could provide a good guidance for the PhD project.   |
| <b>Existing research infrastructure and support</b> | <p><b>Ph.D scholarship includes:</b></p> <ul style="list-style-type: none"> <li>• Annual stipend: €4.740-5.400 per year (duration 4 years);</li> <li>• Support for travel and consumables: €1.600 per year for 4 years;</li> <li>• Health insurance subsidy;</li> <li>• Access to new infrastructure at Institute of Marine Research including a portable acoustic water level sensors (4Hz frequency) to proceed field experiments.</li> </ul> <p><b>Additional:</b></p> <ul style="list-style-type: none"> <li>• Reduced fee accommodation (€1.360 per year) in the University campus;</li> <li>• Student rates for public transport;</li> <li>• Additional travel funding and extra stipend possibilities from National</li> </ul>   |

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|  | Research Council (subject to individual applications); <ul style="list-style-type: none"><li>• Participation in the COST CA17105 “A Pan-European Network For Marine Renewable Energy With A Focus On Wave Energy” action.</li></ul> |
| <b>Potential supervisor [contact person for the topic]</b> | Loreta Kelpšaitė-Rimkienė (KU), loreta.kelpsaite@jmtc.ku.lt   |
| <b>Potential scientific advisor</b>                        | Prof. Georg Umgiesser (KU/ISMAR-CNR); prof. Tarmo Soomere (TTU).  |