2016-07-05

Developing a National Community-serving Numerical Wave Tank Facility

Ransley, E

DEVELOPING A NATIONAL COMMUNITY-SERVING NUMERICAL WAVE TANK FACILITY

E. Ransley[1], D. Greaves[1], D. Graham[1], A. Kyte[1], L. Qian[2], D. Causon[2], C. Mingham[2], J. Zang[3], Q. Ma[4], S. Yan[4], G. Tabor[5], C. Jones[6], G. Poulter[6]

[1]School of Marine Science and Engineering, Plymouth University, edward.ransley@plymouth.ac.uk
[2]School of Computing, Mathematics & Digital Technology, Manchester Metropolitan University
[3]Department of Architecture and Civil Engineering, University of Bath
[4]School of Mathematics, Computer Science & Engineering, City University London
[5]College of Engineering, Maths and Physical Sciences, University of Exeter
[6]Rutherford Appleton Laboratory, Science and Technology Facilities Council

ABSTRACT

The UK has an outstanding record of research in Wave Structure Interaction (WSI) and good reason to maintain this status, particularly in the light of its leading position in the development of modern offshore renewable energy (ORE) technologies. However, the challenges facing the WSI community in developing the necessary complex, multi-physics, multi-component suit of Computational Fluid Dynamics (CFD) software are significant and represent a goal that can only be achieved through a collaborative code development environment.

In response, a new Collaborative Computing Project (CCP) has been established to serve the UK research community in the area of WSI. The project brings together computational scientists, CFD specialists and experimentalists to develop a UK national Numerical Wave Tank (NWT) facility that complements existing and future UK experimental laboratory facilities and supports leading-edge research in marine, coastal and offshore engineering.

The overarching aims of the CCP-WSI Project are to develop and maintain a robust and efficient computational WSI modelling tool, build the community of researchers and developers around WSI and provide a focus for software development and code rationalization.

These aims will be achieved through a combination of advanced training and software development courses, focus group workshops and road-mapping exercises, providing a forum for sharing ideas, training community members and building a framework for innovation and development of strategic software. The reach of the project will be extended through a future flagship software development bids and both public and industrial outreach projects, including short-term pilot projects and secondments to run feasibility studies.

The primary elements of the opensource NWT code have been established and are held within a central code repository (CCPForge) providing an environment for sharing developments collaboratively within a community of partners. The code is professionally software engineered, maintainable and sustainably managed for the future with a clearing house to help contributors meet the necessary quality standards and identify good data formats, validations, documentation and meta-data requirements. A number of benchmarking test cases have also been identified and software development is underway to investigate the key fundamental physical processes involved in offshore wave impact, including aeration and hydroelasticity effects.