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دانشکده مهندسی مکانیک

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Structural integrity assessment of offshore wind turbine sub-structure

Wind turbines and their supporting structures, which are made of welded steel plates, are subjected to extreme loading conditions in the harsh offshore environment with the constant exertion of combined wave and wind forces introducing both fatigue and corrosion damage. This implies that the fatigue crack initiation and growth behaviour of these offshore welded structures, particularly the foundation sub-structures, need to be accurately characterised in air and seawater in order to provide precise remaining life estimates and effective inspection plans for offshore wind turbine structures. The design of current offshore wind turbine foundation structures has been based largely on the fatigue design curves available in DNV standard. The original research to develop these design curves is now several decades old and these tests were carried out on relatively small-scale Oil & Gas offshore structures. This is why the SLIC (Structural Lifecycle Industry Collaboration) joint industry project, collaboration between 10 of the largest Offshore Wind Operators in the world, was formed to redefine standards for offshore wind turbine sub-structures. Cranfield University is the technical lead of the SLIC project. A summary of this research programme and some preliminary results from the SLIC project are presented in this talk. The results from the SLIC project will be implemented in new standards and are expected to have a significant impact on driving down the cost of offshore wind energy.



Dr Ali Mehmanparast completed his undergraduate, PhD and Post-doc studies in the Mechanical Engineering Department at Imperial College London. He is currently a Lecturer in Structural Integrity at Cranfield University. He also acts as the Manager of the EPSRC funded Renewable Energy Marine Structures (REMS) Centre for Doctoral Training (CDT), which is a collaborative partnership between Cranfield University and the University of Oxford.

Dr Mehmanparast also sits on the Engineering Integrity Society (EIS) Durability and Fatigue Committee and the UK Forum for Engineering Structural Integrity (FESI). He is a member of the local technical committee for the International Fatigue 2017 conference in Cambridge. He is also a member of the technical delivery team in the Offshore Wind Structural Lifecycle Industry Collaboration (SLIC) Joint Industry Project (JIP) project, a consortium of the largest offshore wind operators aiming to redefine the international standards used to calculate the structural integrity of the monopile structures used to support wind-power turbines.