

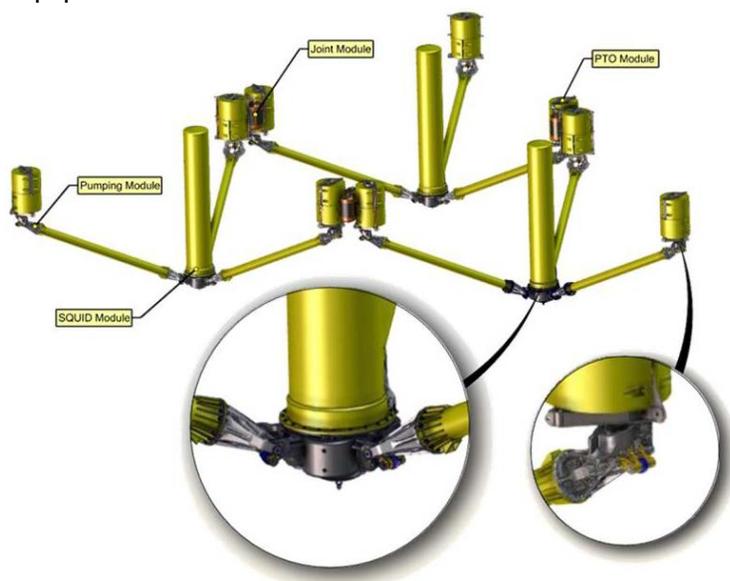
PRACE SHAPE and Albatern: producing power from waves

Albatern's wave power generation product consists of buoyant Squid modules which have three arms and are capable of linking with up-to three other Squids. The Squid modules and their link-arms contain mechanisms to generate power, capturing the heave and surge motion of the waves via hydraulics. In this way, Albatern an innovative Scottish SME of 15 engineers has developed a highly scalable, modular wave power generator. Albatern's project supported by PRACE SHAPE marked the start of the development of a physics code capable of simulating and predicting the power of a large scale Wavenet array (100 or more devices).

Wave energy prototypes are large, expensive and funded through risk capital. As a result prototype simulation also forms an essential part of the device design process. To progress beyond the limitations of current, commercially available software, it was proposed to construct a new, modular solver capable of capturing the behaviour of large scale Wavenet arrays. Through their SHAPE Project Albatern has prototyped with the support of PRACE experts a parallel multibody dynamics solver based on computational methods used in computer graphics and gaming, using the PETSc open source numerical library and scaled out on a CRAY XC30 at EPCC.

"Simulations demonstrating the potential cost and performance improvements gained through deploying extremely large, coupled wave energy arrays will be a breakthrough for the industry," says Dr. William Edwards of Albatern. "The PRACE project has helped Albatern develop in house software that will directly aid expanding the scope of their simulation capability. Albatern is now in a position to write a multibody dynamics code that will share common parts of the simulation procedure allowing interchange of either the simultaneous or sequential methods."

Since the start of this SHAPE project, Albatern have deployed their first power generating array off the Island of Muck, on the West Coast of Scotland. The array for a total capacity of 22kW, comprised of three squid devices, will supply a fish farm with electrical power for running lighting and feeding equipment.



A WaveNET array of three Squid devices
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PARTNERSHIP FOR ADVANCED COMPUTING IN EUROPE

Project details

Leader: Dr. William Edwards, Albatern, United Kingdom
Collaborators: Mr. David Finley, Albatern, United Kingdom
Dr. David Scott, EPCC, United Kingdom
Mr. Paul Graham, EPCC, United Kingdom
Research field: Engineering and Energy
Resource awarded: Albatern accessed the CRAY XC30 ARCHER at EPCC, United Kingdom

More detailed results of this project, as well as the other 10 first SHAPE projects are available on the PRACE website: <http://www.prace-ri.eu/shape-pilot-projects/>

About Albatern

Albatern is a wave energy technology company based in Edinburgh, United Kingdom, and develops novel interconnected offshore marine renewable energy devices. WaveNET is a radical new solution to the problem of economically viable wave energy harvesting. In contrast to the majority of existing approaches, WaveNET is designed to exploit the interactions between absorbers within a coupled, modular and scalable three-dimensional structure that offers a step change technology with more efficient operation at lower cost. <http://albatern.co.uk>

About SHAPE

SHAPE, the SME HPC Adoption Programme in Europe is a pan-European, PRACE-based programme supporting HPC adoption by SMEs. The Programme aims to raise awareness and equip European SMEs with the expertise necessary to take advantage of the innovation possibilities opened up by High Performance Computing (HPC), thus increasing their competitiveness. <http://www.prace-ri.eu/shape>

About PRACE

The Partnership for Advanced Computing in Europe (PRACE) is an international non-profit association with its seat in Brussels. The PRACE Research Infrastructure provides a persistent world-class high performance computing service for scientists and researchers from academia and industry in Europe. The computer systems and their operations accessible through PRACE are provided by 4 PRACE members (BSC representing Spain, CINECA representing Italy, GCS representing Germany and GENCI representing France). The Implementation Phase of PRACE receives funding from the EU's Seventh Framework Programme (FP7/2007-2013) under grant agreements RI-283493 and RI-312763. For more information, see www.prace-ri.eu

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