流体力学

S0101 **CSTAM2015-A21-E0009**

Oscillating wave surge converters

Dias Frederic
University College Dublin, Ireland

New mathematical models have been developed to study the behaviour of wave energy converters and in particular of oscillating wave surge converters (OWSC). The models can be used to investigate the behaviour of various types of arrays of OWSCs in random seas. The mathematical models are based on linear theory and therefore are not valid when the waves become nonlinear. Computational models have also been developed to be able to deal with nonlinear waves. These tools are well suited to study the slamming of OWSCs. Comparisons between numerical results and experimental results will be presented.

frederic.dias@ucd.ie

S0102 **CSTAM2015-A21-E0010**

The amazing cavitation bubble: From ship propellers to medical supertools

Brennen Christopher Earls
Hayman Professor of Mechanical Engineering, Emeritus California Institute of Technology, Pasadena, California 91125, USA

Cavitation bubbles are now used in a remarkable range of surgical and medical procedures. By creating cavitation bubbles non-invasively and thereby depositing and focusing energy non-intrusively, one can generate minute incisions or target cancer cells. This lecture will begin by ranging over some of the fundamentals of cavitation and will end with a vision of the new horizons for the amazing bubble, in the process ranging from ship's propellers to medical supertools.

brennen@caltech.edu

S0103 **CSTAM2015-A21-E0011**

Some multi-scale problems in wave hydrodynamics

Mei Chiang C.
Engineering Emeritus, Mass. Inst. Tech., USA
Shanghai Jiao Tong University, Shanghai 200240, China

We shall first discuss the principles of ANACONDA which is a novel design of wave power converter. In the second example, the propagation of internal tides and surface waves over randomly irregular seabed is discussed. In the last example we describe the dissipation of wave energy by a shallow canopy consisting of an array of vertical cylinders.

ccmei@mit.edu

S0104 **CSTAM2015-A21-E0012**

高速列车动模型实验平台研制和初步实验研究

杨国伟
中国科学院力学研究所流固耦合系统力学重点实验室, 北京 100190

重点介绍在国家科技支撑计划项目支持下的高速列车动模型实验平台研制原理. 针对我国实际运用的单双向隧道截面的缩比模型, 开展了不同隧道长度的单车隧道通过和隧道会车压力波测试实验研究. 相关测试结果也在文中做简要介绍.

Gwyang@imech.ac.cn

S0105 **CSTAM2015-A21-E0013**

移动粒子半隐式方法（MPS）的发展与应用

陈斌
西安交通动力工程多相流国家重点实验室, 西安 710049

针对移动粒子半隐式方法存在的稳定性差、精度低、计算效率低下、缺乏湍流模型和多相流界面算法等问题, 对 MPS 方法开展深入研究, 取得的进展如下：(1) 提出了黏性项的精确度条件和稳定性条件; (2) 为了减少湍流直接数值模拟的计算量, 发展了静态和动态 Smagorinsky 亚粒子应力模型, 实现了 MPS 的大涡模拟; (3) 将 MPS 扩展至多相流动; (4) 比较了多个求解器的并行表现, 发现共轭梯度法是最合适的并行求解器. 基于 OpenMP/MPI 模型完成了 MPS 的并行化, 在 100 核的集群服务器上可加速 51.25 倍.

chenbin@mail.xjtu.edu.cn

S0106 **CSTAM2015-A21-E0014**

微通道内颗粒汇聚与分离的机理研究及应用

胡国庆
中国科学院力学研究所非线性力学国家重点实验室, 北京 100190

采用三维直接数值模拟, 结合实验观测, 深入探讨液滴和颗粒在矩形微通道内侧向迁移行为和平衡位置的稳定性与数量, 提出了矩形微通道中获得良好聚集模式的准则. 进一步通过调配黏弹性流体, 结合黏弹性效应和惯性效应, 在简单直通道内实现了血细胞与肿瘤细胞及细菌的高效分离.

guoqing.hu@imech.ac.cn

S0107 **CSTAM2015-A21-E0015**

定常共振波系之发现

廖世俊, 徐妲莉, 刘曾
上海交通大学船舶海洋与建筑工程学院, 上海 200240

廖世俊教授 1992 年原创性提出的一种求解强非线性问题的数学方法 —— "同伦分析方法"(Homotopy Analysis Method, HAM). 近年来, 廖世俊研究小组应用 "同伦分析方法" 首次从理论上获得无限和有效水深中的 "定常共振波系", 率先从理论上发现了 "定常共振波系" 之存在. 随后, 廖世俊小组利用 "海洋工程国家重点实验室" 的风浪流水池, 首次用实验证实了该 "定常共振波系" 之存在. 该理论和实验研究丰富和完善了共振波浪理论. "定常共振波系" 的发现, 再一次证实了 "同伦分析方法" 的新颖性和潜力.

sjliao@sjtu.edu.cn

S0108 **CSTAM2015-A21-E0016**

Logarithmic temperature profiles in turbulent thermal convection

He Xiaozhou