



## Focusing of seismic wave and harbor resonance

By

**Professor Jeng-Tzong Chen, Department of Harbor and River Engineering & Department of Mechanical and Mechatronics Engineering, National Taiwan Ocean University, Keelung, Taiwan; email: jtchen@ntou.edu.tw**

**Speaker: Prof. Jeng-Tzong Chen**

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Polytechnic University**

陳正宗 終身特聘教授，生於1962年，分別於1984年、1986年、1994年取得台灣大學土木工程學系學士學位、台灣大學應力所碩士學位及台灣大學土木工程研究所博士學位。1986至1990年間，於中山科學研究院火箭飛彈系統結構部門從事結構力學計算。1994年至海洋大學河海工程學系擔任副教授一職，1998年晉升為教授。2001與2004年分別獲聘海洋大學第一屆優良教師與特聘教授。2005年獲選台大傑出校友(土木)。2007年獲聘海洋大學終身特聘教授。主要研究領域為計算力學，曾與洪宏基教授合作推導出對偶積分方程再以對偶邊界元素法求解含退化邊界的邊界值問題作出貢獻。陳正宗教授帶領海大 NTOU/MSV 研究團隊發展出四套對偶邊界元素法程式，Laplace 方程，Helmholtz 方程，修正 Helmholtz 方程與 Navier 方程，並撰寫了兩本有關邊界元素法和有限元素法的中文書籍，也曾受邀到保加利亞 (Colloquium of Numerical Analysis)、聖彼得堡 (BEM-FEM 2003)、奧地利、中國合肥、日本京都和阿根廷 (World Congress on Computational Mechanics) 發表論文演說。連續兩次獲得國科會傑出研究獎(1999-2005)及第一屆吳大猷先生紀念獎(2002-2005)並獲聘 A 級計畫主持人(2005-2007)與國科會傑出學者計劃，發表逾百餘篇(151) SCI 論文分佈於四十餘種期刊並被超過近八百餘篇論文引用過。研究論文入榜 ESI 高引用率資料庫。兩篇論文(ASCE, ASME)在 SCOPUS 被引超過百次。陳正宗終身特聘教授曾任海洋學刊執行編輯與國際計算機材料與連體期刊(Computers, Materials and Continua)編委。現為中國土木水利學刊常務編輯，中國工程學刊土木編委(SCI)，海洋學刊編委(SCI)，亞太工程學報編委，國際計算方法期刊(Int. J. Comp. Meth.)、國際邊界元素法通訊編委 (Boundary Element Communications)、工程科技計算模擬期刊(CMES, SCI)與國際邊界元素法電子期刊(Electronics Journal on BEM)編委，現任工程中邊界元素法期刊編輯(EABE, SCI)、並審過六十餘種期刊論文。由北京清華工程力學系根據最新 ISI Web of Science 資訊統計查得陳正宗教授為二十一世紀世界邊界元素法究研學者 Top 1。

### Seminar Abstract



Scattering of elastic and water waves by a semi-circular hill and harbor, respectively, are solved by using null-field boundary integral equations in conjunction with degenerate kernels. Focusing phenomena are both observed. Five advantages, well-posed linear algebraic system, principal value free, elimination of boundary-layer effect, exponential convergence, and mesh free, are achieved. Several examples by a semi-circular/elliptical hill or harbor were demonstrated to see the validity of the present formulation. The present method can be seen as a semi-analytical approach for boundary value problems containing circular or elliptical boundaries. Besides, the analogy between the SH wave scattering and harbor resonance is addressed.

#### References

- [1] Chen J T, Chen P Y and Chen C T, 2008, Surface motion of multiple alluvial valleys for incident plane SH-waves by using a semi-analytical approach, *Soil Dynamics and Earthquake Engineering*, **28**, 58-72.
- [2] Chen J T, Lee J W, Wu C F and Chen I L, 2010, SH-wave diffraction by a semi-circular hill revisited: a null-field boundary integral equation method using degenerate kernels, *Soil Dynamics and Earthquake Engineering*, Accepted.
- [3] Chen J T, Lee Y T and Lin Y J, 2009, Interaction of water waves with arbitrary vertical cylinders using null-field integral equations, *Applied Ocean Research*, **31**, 101-110.
- [4] Chen J T, Lin Y J and Lee Y T, 2010, Water wave interaction with surface-piercing porous cylinders using null-field integral equations, *Ocean Engineering*, Accepted.