



Focusing of seismic wave and harbor resonance

By

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Speaker: Prof. Jeng-Tzong Chen

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Professor Jeng-Tzong Chen, born in 1962, received a BS degree in Civil Engineering, an M.S. in Applied Mechanics, and a Ph.D. in Civil Engineering, respectively, in 1984, 1986 and 1994, from National Taiwan University, Taipei, Taiwan, R.O.C. He had worked as a research assistant in the Structural Division of the Department of Rocket and Missile System, Chung Shan Institute of Science and Technology, from 1986 to 1990. In 1994, he was invited to be an Associate Professor in the Department of Harbor and River Engineering, National Taiwan Ocean University, Keelung, Taiwan, R.O.C. He was promoted to a full professor in 1998. Later in 2004, he was selected to be the Distinguished Professor. In 2007, he was selected as the Life-time Distinguished Professor. He is also the Professor of Department of Mechanical and Mechatronic Engineering of Taiwan Ocean University. His major interest is computational mechanics. He had derived the theory of dual integral equations for boundary value problems with degenerate boundary. Prof. Chen also developed four dual BEM programs for the BVPs of Laplace equation, Helmholtz equation, bi-Helmholtz and modified Helmholtz equation and Navier equation. Recently, he also employed the null field integral equations to solve BVPs with circular and/or elliptical boundaries including holes and inclusions. He wrote two books in Chinese on dual BEM and FEM using MSC/NASTRAN, respectively. He was ever invited to give plenary and keynote lectures, e.g., twice in World Congress on Computational Mechanics (WCCM4 (1998) in Buenos Aires and WCCM5 (2002) in Vienna), twice in ICOMÉ 2006 and 2009, FEM/BEM 2003 in St. Petersburg, Russia and ICIP 2010 in Hong Kong. Also, he is now the editor of *Engineering Analysis with Boundary Elements*. He has been the Editor of *Journal of Marine Science and Technology* and the guest editor of *J. Chinese Institute of Engineers*. He won three times of Outstanding Research Awards from National Science Council, Taiwan. He also won the first Wu, Ta-You Memorial Award in 2002. He is currently the member of editorial board of five international SCI journals. Until now, he has published more than 158 SCI papers on BEM and FEM in technical Journals. More than 800 papers are found to cite Chen's work. Boundary element method is one focus of Professor Chen's research interests. Others may be categorized into two areas. One is vibration and acoustics, and the other is computational mechanics.

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

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- [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.
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- [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.