

**Scattering problem of shallow-circular canyon subject to SH wave by using the null-field boundary integral equation method**

Yin-Hsiang Hsu

Department of Harbor and River Eng., National Taiwan Ocean University  
2 Pei-Ning Rd., Keelung  
Taiwan  
[M98520021@ntou.edu.tw](mailto:M98520021@ntou.edu.tw)

**Joint work with: Jeng-Tzong Chen, Ying-Te Lee and Jia-Wei Lee**

The main concern of this work is to study the influence of a canyon on the ground motion due to earthquake. Following the successful experiences of solving the scattering problem subject to the SH wave for a semi-circular canyon we extend the null-field boundary integral equation method (BIEM) to solve the problem of shallow-circular canyon subject to the SH wave instead of a semi-circular canyon. In order to utilize the circular geometry, the original problem (half-plane problem) is imbedded to an infinite domain with an artificial boundary of a full circle instead of the image method such that the degenerate kernel can be fully adopted. By expanding the fundamental solution into the degenerate kernel and using the Fourier series to simulate the boundary density, the field point can be exactly located on the real boundary and is free from calculating Cauchy and Hadamard principal values. By locating the collocation point on the real boundary to match the boundary condition, a linear algebraic system can be obtained. Finally, several examples are used to verify the validity of the present approach. Parameter studies of the wave number and incident angle of the SH wave were also investigated.

**Keywords:** scattering of SH-wave, shallow-circular, degenerate kernel, null-field boundary integral equations.