

# **Anti-plane shear problems containing several elliptical holes and/or inclusions**

**Y. T. Lee and J. T. Chen**

Department of Harbor and River Engineering, National Taiwan Ocean University  
Keelung, Taiwan  
D93520002@mail.ntou.edu.tw

## **Abstract**

In this paper, we focus on an infinite plane containing several elliptic holes and/or inclusions subject to remote shear by using the null-field integral equation instead of the complex potential method. Here, not only elliptic holes but also elliptic inclusions buried in an infinite plane are considered. For fully employing the elliptic geometry, fundamental solutions were expanded into the degenerate form by using an addition theorem in terms of the elliptic coordinates. Boundary densities are also described by using the eigenfunction expansion. It is worthy of noting that the Jacobian terms exist in the degenerate kernel, boundary density and contour integral; however, these Jacobian terms would cancel out to each other and the orthogonal property is preserved in the process of contour integral. Finally, two examples of an infinite plane containing one and two elliptical inclusions are given to verify the validity of the present approach. A special case of a crack is also addressed.

**Keywords:** antiplane elasticity, Laplace problem, elliptical inclusion, null-field integral equation