

2012 Special Program in Applied Mathematics and Applied Mechanics

Nonuniqueness in BIEM/BEM and its treatment using SVD

2012 - 03 - 21 (Wed.)

15:00 - 17:00

308, Mathematics Research Center Building (ori. New Math. Bldg.)

It is well known that nonuniqueness occurs in BEM for degenerate problems containing degenerate scale, degenerate boundary, spurious eigenvalue and fictitious frequency as shown in Figure 1. By employing the SVD technique with respect to the four influence matrices in the dual BEM, the degenerate mechanism can be studied in a unified manner. It is interesting to find that true information in physics due to rigid body mode and true eigensolution is found in the right unitary vector with respect to the corresponding zero singular value while the spurious information in mathematics due to degenerate boundary, degenerate scale, spurious mode and fictitious frequency is imbedded in the left unitary vector as shown in Figure 2. The SVD updating term is employed to extract the true information while SVD updating document is utilized to filter out the spurious information. Several examples including degenerate boundary, degenerate scale, spurious eigenvalue and fictitious frequency are demonstrated to see the unified formulation.

