

On null fields in the BIEM/BEM

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Abstract

Review of the BEM and BIEM development in Taiwan in the past thirty years is introduced in the beginning (by the personal point of view). Besides, the current status of EABE journal is reported (on behalf of an associate editor). Then, the recent advances by NTOU/MSV group for null fields in the BIEM/BEM are addressed (as a head of this group). Solvability of integral equations as well as nonuniqueness occurs in the BIEM/BEM for boundary value problems containing degenerate scale, degenerate boundary, spurious eigenvalue and fictitious frequency. 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. True information in physics due to rigid body mode and true eigensolution are 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 eigenvalue and fictitious frequency is imbedded in the left unitary vector. The SVD updating term is employed to extract the true information while the SVD updating document is utilized to filter out the spurious information. Null field and nonzero field in the complementary domain for the ordinary case and irregular case, respectively, are emphasized. Treatment

to ensure the unique solution is also examined. Several examples including degenerate scale, spurious eigenvalue and fictitious frequency are demonstrated to examine null fields.

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