APPROXIMATION OF A LAPLACE-STEKLOV EIGENVALUE PROBLEM BY FINITE AND BOUNDARY ELEMENT METHODS

ÖNDER TÜRK

Abstract. The discrete formulations based on finite and boundary element methods to approximate the solution of a Laplace-Steklov eigenvalue problem are investigated. The problem is defined in a way that the eigenvalue is involved in both the differential equation and boundary conditions. Therefore, it can be obtained by originally generalizing the Laplace and Steklov eigenvalue problems. Such generalized problems arise for instance as the auxiliary eigenproblems when a parabolic initial-boundary value problem with dynamic/Wentzell type boundary condition is spectrally analyzed. The study aims primarily to provide several characteristics related to the application of finite and boundary element approaches to approximate the novel eigenproblem. A comparative analysis of the results obtained from these two methods will be presented. The characteristic properties of the components in the spaces obtained from the discretization of this problem on appropriately defined domains will also be studied along with the mathematical properties of functions existing in these solution spaces.

Keywords: Laplace-Steklov eigenvalue problems, finite element methods, boundary element methods.

Middle East Technical University, Ankara, Turkey
Email address: onder.turk@yandex.com