Adaptive refinements for localized axial Green’s function method

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ABSTRACT

Adaptive method is needed for improving accuracy of the numerical solution in certain regions of interest. The axial Green’s function method (AGM)\cite{1,2} enables us to calculate the numerical solutions of multi-dimensional problems using only one-dimensional Green’s functions for the axially split differential operators. We consider adaptive methods for the localized AGM (LAGM)\cite{3} which has been developed solving convection-diffusion equations. This LAGM is one for the practical purpose in computation of the numerical solutions for convection-diffusion equations. Using the LAGM, we can calculate the numerical solution without loss of accuracy even in cases of large convection and complicated domains. When we have to calculate an accurate solution near singularities or on a very small portion of the entire domain, the adaptive method comes to the light. For this purpose in LAGM, here we develop possible adaptive methods and compare one another. According to the numerical results, it is found that stability and accuracy depend on proposed adaptive methods. The key point of these adaptive methods is how to merge the numerical solution between two regions of adaptation. The AG-adaptation among the proposed methods turns out to be the best.

REFERENCES