Review of: "Taylor Series Based Domain Collocation Meshless Method for Problems with Multiple Boundary Conditions including Point Boundary Conditions"

Ersİn Aslan

Potential competing interests: No potential competing interests to declare.

In this paper, a Taylor series based domain collocation PDE solution methodology is proposed. The proposed methodology is well suited to handle multiple boundary conditions including point boundary conditions. The main idea of the method is to formulate a function which satisfies all the boundary conditions and then generalize the function to a family of functions by using Taylor series. Since the family of functions already satisfies the boundary conditions, the PDE solution can be determined by finding the values of unknown Taylor coefficients for which the residual of the PDE over the domain is closest to zero. Using domain collocation method, the linear PDE problem transforms into a linear regression problem. The proposed method is extended by using multi-point Taylor series to solve problems with point boundary conditions. The proposed method has been successfully applied to solve homogenous/non-homogenous Helmholtz and Poisson's PDEs in the paper. The proposed methodology has also been shown to solve complex PDEs efficiently with less number of degrees of freedom (DOFs) as compared to Taylor meshless method (TMM). The proposed method is illustrated for both problems with Dirichlet and Neumann boundary conditions. Moreover, the method has been also presented to solve a problem where the boundary is defined using a set of points instead of an analytical function.

Consequently, I recommend that the paper is acceptable for the publication in the journal "Qeios".