Solving Biharmonic equation using the localized method of approximate particular solutions

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Biharmonic equation is one of the most existing operator in many areas, especially in fluid and solid mechanics, but difficult to solve due to the fourth order derivatives in the differential equation. In this paper we deal with the use of the local particular solution method to solve the two-dimensional biharmonic equation in a bounded region. The technique is based on decoupling the biharmonic problem into two Poisson equations and then, the local particular solution for Laplace equation is applied to each problem to compute their numerical solutions. The efficiency of the proposed method is demonstrated by solving different examples with both regular and irregular domains. A comparison with the Local Kansa method is also demonstrated. The influence of the shape parameter and different radial basis functions on the numerical solution is discussed.

Keywords: Radial basis functions, method of fundamental solutions, biharmonic equation, method of particular solutions