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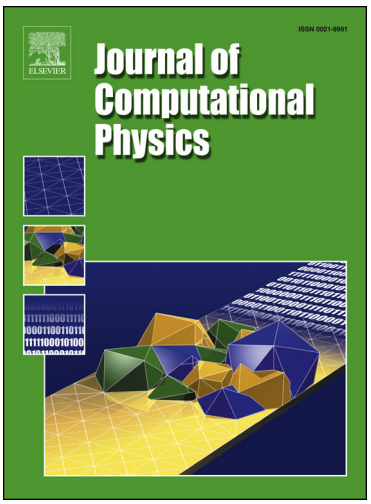

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Fractional Hermite Interpolation using RBFs in High Dimensions over irregular domains with application

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Abstract

In the interpolation method, in some cases, one often has a number of data points and its derivatives, which are obtained by sampling or experimentation. In this case, the problem of finding an approximating function passing through these points and coinciding with given values of its derivatives at these points is generally known as "Hermite interpolation". The Hermite interpolation is mostly a method of interpolating data points as a polynomial function that is faced with some challenges in high dimensions and on irregular domains. Radial basis functions take advantage of being flexible with respect to geometry, easy to implement in higher dimensions, and can also provide high order convergence. So, they can be applied as a suitable tool to high dimensional Hermite interpolation problem on irregular domains. In many applied systems, commonly available derivatives information is presented using fractional order derivatives instead of integer ones. For this purpose, in this paper, we assume that the values of an unknown function and its fractional derivatives at some distinct points are presented. Therefore, we intend to apply a new approach, which we call it as "fractional Hermite interpolation" with radial basis functions in high dimensions. Optimal recovery conditions for the fractional Hermite interpolant are investigated. Then, the existence and uniqueness of the solution in this

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