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IG-DRBEM of three-dimensional transient heat conduction problems. (English)

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Summary: In this paper, the isogeometric dual reciprocity boundary element method (IG-DRBEM) is proposed to solve three-dimensional transient heat conduction problems. It is well known that the error of traditional BEM mainly comes from element dispersion, and the introduction of isogeometric ideas makes BEM become a veritable high-precision numerical method. At present, most of the problems solved by isogeometric BEM (IGBEM) are time-independent. The reason is similar to the traditional BEM, which cannot avoid solving domain integrals when solving time-dependent problems. In this paper, based on the potential fundamental solution the boundary-domain integral equation is obtained by the weighted residual method, where the classic dual reciprocity method is adopted to transform domain integrals into boundary integrals. Meanwhile, a two-level time integration scheme is used to solve the discretized differential equations. In addition, the adaptive integration scheme, the radial integral transform method and the power series expansion method are adopted to solve the boundary regular, nearly singular and singular integrals. Several classical numerical examples show that the presented method has good numerical stability and high precision by considering different factors such as the approximation function, the time step, the number of interior points and so on.

MSC:

65-XX Numerical analysis

76-XX Fluid mechanics

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