

论文

非结构四面体网格上扩散方程的有限体积差分方法

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摘要:

基于二维扩散方程的有限体积方法,构造了三维扩散方程在非结构网格上有限体积差分方法,方法具有高精度和保持通量守恒特性.采取单元中心作为计算节点来减少向量和单元体积的计算量.利用通量守恒条件确定界面中心的函数值,保证了方法的守恒特性.用Lagrange因子插值法更好地适应了非结构网格.采取Bi—CGSTAB方法求解线性代数方程组.计算例子验证方法有效.

关键词:

AN UNSTRUCTURED TETRAHEDRAL MESH FINITE VOLUME DIFFERENCE METHOD FOR THE DIFFUSION EQUATION

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Abstract:

Based on the finite volume difference method of 2D diffusion equation, a finite volume difference method for 3D diffusion equation on unstructured tetrahedron grids was constructed. The scheme has high precision and can keep flux conversation. By choosing the cell-center nodes as the calculation nodes, the computational scale of the volumes of cells and vectors is reduced. The cell is divided into 12 small integral domains, which makes the flux density of the interface of cells can be computed more easily. The conditions of flux conservation were used to get the values at the central of interface. Lagrangian multiplier method makes the method more suitable for unstructured grids. Bi-CGSTAB was used to solve linear algebra equations. The scheme shows good characteristic on different grids and can be easily expanded to the numerical simulation of nonlinear problems.

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