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### 通过Adomian分解法求解二维Helmholtz方程

Adomian decomposition method for solving two dimensional Helmholtz equations

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中文摘要:

提出基于Adomian分解法求解二维Helmholtz方程。通过Adomian分解法可以把Helmholtz微分方程和边界条件分别转换成递归代数公式和适用符号计算的简单代数公式。利用它可以很容易得到方程的解析解表达式。Adomian分解法的主要特点在于计算简单快速, 并且不需要进行线性化或离散化。最后给出数值实例以验证Adomian分解法求解二维Helmholtz方程的有效性。通过数值计算可以发现, 基于Adomian分解法的计算结果非常接近精确解, 并且该方法具有良好的收敛性。这表明Adomian分解法能够快速有效求解Helmholtz方程。

英文摘要:

The Adomian decomposition method (ADM) is employed in this paper to solve two dimensional Helmholtz equations. Based on the ADM the Helmholtz different equation becomes a recursive algebraic equation. Furthermore, the boundary conditions become simple algebraic equations which are suitable for symbolic computation. By using boundary conditions, the closed-form series solution can be easily obtained. The main advantages of ADM are computational simplicity and involve any linearization or discretization. Finally, several computed examples are presented to check the reliability of the method. Comparing the results with the exact solutions, excellent agreement is achieved. The numerical results demonstrate that the ADM is quite accurate and readily implemented. Furthermore, good convergence and the excellent numerical stability of the solution based on the ADM can also be found. It means that the ADM is quite efficient and is practically well suited for solving two dimensional Helmholtz equations.

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