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1D Time-varying Temperature Prediction Based on PINN

摘要

本文探究了运用物理信息神经网络解决一维时变无限大平板温度场问题的可行性，并将该方法与传统数值方法进行了对比。物理信息神经网络将物理原理融入学习算法，为处理复杂的偏微分方程问题提供了一种新方法。在本研究中，分别对有内热源和无内热源的一维时变无限大平板的温度场进行了研究。研究结果表明，物理信息神经网络无需网格划分，仅依靠随机采样点就能达到与传统数值方法相当的求解精度和速度。尽管如此，物理信息神经网络在解决更复杂热传导问题上的有效性仍需进一步研究。

关键词

PINN；一维时变无限大平板；热传导；数值方法

Abstract

This paper explores the feasibility of using physical information neural network to solve the time-dimensional infinite plate temperature field problem, and compares the method with the traditional numerical method. Physical information neural networks integrate physical principles into learning algorithms and provide a new method to handle complex partial differential equation problems. In this study, the temperature field of a one-dimensional time-varying infinite plate with an internal and no internal heat source is studied respectively. The results show that the physical information neural network can achieve the same solution accuracy and speed by relying only on random sampling points. Nevertheless, the effectiveness of physical information neural networks in solving more complex heat conduction problems still needs further research.

Keywords

PINN; one-dimensional time-varying infinite plate; heat conduction equation; numerical method

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