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多场耦合方程的多尺度渐近解

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Multi-scale asymptotic solutions of multi-field coupled equations

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摘要 介绍由约束场和受重力影响的对流扰动耦合而成的衰减平衡向量场动力学方程的渐近求解.为分析实验室内微观与自然界中宏观现象的正则和奇异扰动问题,运用复合尺度方法进行傅立叶调和分析、尺度变化,并引进新的参数,将一个复杂的三维约束耦合动力学方程转化成复空间里一维的边界层问题.并做了渐近摄动 分析,给出两个多场耦合中扰动问题的特征函数边界层解法例,在例,2,中对流场扰动问题分析, 得出从指数振荡解过渡到代数解的转点.

关键词: 耦合动力学方程   边界层问题   渐近摄动分析   转点   耦合动力学方程   边界层问题   渐近摄动分析   转点

Abstract： This article described the complex fluid and the field constraints with gravitational effects.The asymptotic solution determines the dissipative equilibrium vector field of the coupled convection disturbance kinetic equations. For the analysis of the canonical and singular perturbation problems we analyze the micro-phenomena of the laboratory and macro-phenomena of nature.Our approach is to use the complex Fourier harmonic analysis, re-scale, and the introduction of new parameters to reduce the three-dimensional coupling dynamic equations into a one-dimensional complex space of boundary-layer. Two examples for the problem of the perturbation characteristic function were given with asymptotic analysis. Example 2 explains the turning point of the transition that from the index oscillation solution to the algebraic solution.

Key words： boundary problem   asymptotic perturbation analysis   turning point   coupling dynamics equations   boundary problem   asymptotic perturbation analysis   turning point

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