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一种通用的冲击分析模型及低速冲击响应计算

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GENERAL IMPACT ANALYSIS MODEL AND LOW-VELOCITY IMPACT RESPONSE ALGORITHM

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摘要

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摘要 提出了一种通用的冲击分析模型,该模型采用连续介质理论描述,用拖带坐标定义摩擦冲击约束,用虚功原理定义冲击控制方程,可以作为不可刺穿型冲击问题的有限元求解基础。在此模型基础上,针对低速冲击问题,给出了采用自适应罚函数增广 Lagrange 迭代处理接触力的有限元求解方法,既保证计算精度,又有效抑制算法震荡,并用算例进行了验证。

关键词: 冲击模型 摩擦接触 有限元

Abstract: A general model for impact analysis is presented. Based on the continuum theory, the frictional impact constraint is considered with co moving coordinates, and the virtual work principle is utilized to formulate the governing equations. The theory and algorithms can be used as the basis of impenetrable contact impact analysis. A low velocity impact analysis has been accomplished by using FEM algorithms developed in this paper. An augmented Lagrange iteration with adaptive penalty is proposed to ensure the accuracy and to depress the oscillation of the numerical algorithm. Some examples demonstrate the efficiency of the model and the analysis methods.

Keywords: impact model frictional contact finite element method

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