

多相流

## 稠密气固两相流的流场实验显示和粒化温度模型

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**摘要** 在水平激波管中, 研究激波与堆积粉尘的相互作用, 并通过带示踪粒子的X射线和阴影摄影, 记录堆积粉尘内外流场的波系结构. 引入“粒化温度”, 基于稠密气体分子动力学的思路导出堆积粉尘的守恒方程和本构方程, 利用AUSM+格式对激波与堆积粉尘相互作用现象进行了数值模拟. 计算结果与实验结果基本相符.

**关键词**

[激波](#) [颗粒流运动论](#) [X射线脉冲摄影](#) [AUSM<sup>+</sup>格式](#)

分类号

## EXPERIMENTAL VISUALIZATION AND “GRANULAR TEMPERATURE” MODEL FOR DENSE GAS-PARTICLE FLOW

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### Abstract

Experiments on shock waves interacting with a loose particle bed were conducted in a shock tube. The incident shock velocity and particle diameters were measured by pressure transducers and Malvern particle sizer respectively. The flow fields both in gas and granular phase induced by shock waves were recorded by means of shadow graphs and pulsed X-ray shadow graphs with trace particles. The particle motion was strongly controlled by particle-particle collision which was associated with fluctuation kinetic energy of particle. Based on kinetic theory of granular flow, the conservation and constitutive equations for a dense two-phase flow were derived by introducing “granular temperature”, and then numerical simulations were performed by using ASUM+ schemes with the advantages of combining the efficiency of Flux-vector splitting and the accuracy of Flux-difference splitting. Measured and calculated results were in good agreement.

**Key words** [shock wave](#) [kinetic theory of granular flow](#) [pulsed X-ray photograph](#) [AUSM<sup>+</sup>scheme](#)

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