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### 液体燃料云团形成过程的数值仿真

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**摘要:** 针对液体燃料的爆炸抛撒问题, 本文建立了物理数学模型来描述气液云雾形成的初期运动和发展过程。对于初期运动(近场), 建立一维气相运动模型, 同时利用移动边界法处理气、液的接触边界。对于后期的气、液多相混合流动过程(远场), 建立二维多相流模型。对爆炸抛撒全过程编制了计算程序。数值仿真给出了云雾区内重要参数的分布, 计算得到的云雾外形变化与试验结果有较好的一致性。

**关键词:** 液体燃料; 爆炸抛撒; 多相流; 数值仿真

**中图分类号:** O389; TQ560.7

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## NUMERICAL SIMULATION FOR THE FORMATION OF LIQUID FUEL AIR CLOUD

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**Abstract:** In order to explore the problem of liquid fuel explosive dispersal, mathematical and physical model are established to depict the Initial Period of formation and the development process for the fuel-air cloud. For the Initial period of gas-liquid movement (near-field regime), a one-dimensional uniform phase model is proposed to depict the motion of detonation product and liquid fuel ring, by using a method of moving boundary to treat the moving outer boundary. For the later process of multi-phase flow (far-field regime), a two-dimensional multi-phase flow Model is established. Moreover, a computer program for describing the whole process is established. The profiles of physical parameters in the expanding fuel-air cloud are predicted by numerical simulation, and the shape of expanding fuel-air cloud computed is in good agreement with the experimental data.

**Key Words:** liquid fuel explosive dispersal multi-phase flow, numerical simulation

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