多相流和计算流体力学

两喷嘴对置撞击流径向射流流动特征

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摘要

对喷嘴间距与喷嘴直径比为0.5～100范围内两喷嘴对置撞击流径向射流的湍流脉动特征、速度分布和扩展率等进行了实验研究和数值模拟。研究结果表明，撞击流径向射流明显较自由射流湍动强烈；从驻点开始径向射流速度逐渐增大到最大值后开始衰减，射流呈现自相似性；随着喷嘴间距增大，撞击流径向射流的扩展率呈现增大的趋势，大约为自由圆射流的1.5～3倍。采用CFD软件对撞击流径向射流的速度分布特征进行了数值模拟，与实验结果相比，两方程湍流模型预报的撞击流径向射流的扩展率明显偏小，雷诺应力模型的预报精度有较大改进。

关键词

两喷嘴对置撞击流　径向射流　扩展率　热线风速仪

分类号

Flow characteristics of radial jet from two opposed jets

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Abstract

The fluctuation, velocity distribution and spread rate of the radial jet from two opposed nozzles at $L/D＝0.5—100$ were experimentally investigated and numerically simulated, where L is the length of two nozzles separation and D is the nozzle diameter. Results show that the turbulence intensity of the radial jet is obviously higher than that of free jet. The velocity of the radial jet increases to a maximum from the stagnation point then decays and exhibits a self similarity. With the increase of the nozzle separation, the spread rate of the radial jet increases, and is about 1.5—3 times as that of free round jet. The velocity distributions of the radial jet from two opposed nozzles were numerically simulated by CFD. Compared to experimental results, the spread rate is obviously underpredicted by two-equation turbulence models, and the prediction by Reynolds stress model (RSM) is improved..

Key words

two opposed jets　radial jet　spread rate　hot　wire anemometer

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