

分离工程

旋风分离器旋进涡核的数值模拟

吴小林¹;熊至宜 姬忠礼 时铭显²

石油大学(北京)机电系化工装备研究所¹

中国石油大学²

石油大学化工学院³

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摘要 采用雷诺应力模型对旋风分离器内三维非稳态流场进行了模拟计算。结果表明,旋风分离器全空间内都存在旋进涡核现象。对旋进涡核现象和旋进涡核中心的运动规律进行了详细的描述,分析了不同轴向位置的旋进涡核区域内不同点的速度波动幅值和频率,得到了旋进涡核影响范围以及速度波动规律;通过分析旋进涡核中心的运动频率,得到了旋进涡核出现的强度。模拟结果与采用热线风速仪以及激光粒子成像技术(PIV)测定的实验结果基本吻合。研究结果可以分析旋进涡核对分离效率和压降的影响。

关键词 [旋风分离器](#); [旋进涡核](#); [数值模拟](#)

分类号

Numerical simulation of precessing vortex core in cyclone separator

Abstract

The three-dimensional unsteady flow field in a cyclone separator was simulated. The results showed that the precessing vortex core (PVC) phenomenon existed in all axial positions of the cyclone separator. The PVC phenomenon and motion of precessional center of the core was described in detail. The amplitude and frequency of velocity fluctuation in the PVC region at different axial positions was quantitatively analysed, and the scope of influence of PVC and the nature of the velocity fluctuation were discussed. Furthermore, the strength of PVC was determined by analyzing the motion frequency of precessional center. The simulation results agreed with the experimental results of hot wire anemometer and particle image velocimetry (PIV). The influence of PVC on separation efficiency and pressure drop was analysed.

Key words [cyclone separator](#) [precessing vortex core](#) [numerical simulation](#)

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通讯作者 熊至宜 zhiyixiong@yahoo.com.cn

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