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混凝过程中流场结构的PIV测量与表征

Measurement and characterization of the flow field structure by PIV in the process of flocculation

关键词: [PIV](#) [Taylor-Couette反应器](#) [混凝过程](#) [流场测量](#)

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摘要: 采用粒子成像速度场仪(PIV)在不投加专用示踪粒子的条件下,以混凝絮体为示踪粒子,对Taylor-Couette反应器内的絮凝反应流场进行测量与表征.结果表明,内筒旋转雷诺数 Re 在900~2900时,流场中产生的涡具有相似的特殊波状涡结构,相邻涡旋形态大小发生周期性变化,涡间存在主流液体的移动,这种涡结构有利于絮体结合生长成较大的絮体颗粒,便于沉降而导致较高的絮凝沉淀去除率.这也证实PIV技术能够在进行混凝反应的同时,用混凝过程中的微絮体为示踪粒子对混凝过程进行流场测量,不必再额外添加示踪粒子,就能较好地反映混凝过程中涡旋的形态变化特征,从而实现了对絮凝过程的同步测量与表征.

Abstract: Particle image velocimetry (PIV) was applied to measure and characterize the velocity field structure by using the flocs as the tracer particles without seeding any other special particle during the coagulation process. The results indicated that the vortexes generated in the annulus gap had similar special wave structure, the form and size of the adjacent vortexes changed with time periodically, and the bulk fluid motion between vortexes was observed when the azimuthal Reynolds number was in the range of 900~2900. This form and structure of the vortex was favorable for the flocs to combine with each other and grow up, leading to higher flocculation efficiency. This study demonstrated that the flocs formed in the coagulation process can be used as the tracer particles to measure and characterize the velocity field perfectly by PIV, and PIV can be exploited as a useful tool in the synchronized measurement during coagulation processes.

Key words: [PIV](#) [Taylor-Couette reactor](#) [flocculation process](#) [flow field measurement](#)

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