

عنوان مقاله:

Calculation of calibration factor for ultrasonic cross-correlation flowmeter using CFD simulation

محل انتشار:

دومین کنفرانس بین المللی در شیمی و مهندسی شیمی (سال: 1400)

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خلاصه مقاله:

Transient time and Doppler flowmeters are common types of ultrasonic flow measurement technologies. The Ultrasonic Cross-Correlation Flowmeter (UCCF) as a novel technology between ultrasonic flow measurement has received lots of attention due to its several features over two other types of ultrasonic flowmeters. The main advantage of UCCF is independency from the sound speed. Despite the other types of ultrasonic flowmeters, the UCCF does not require any information about the sound speed, so this feature reduce the measurement error. Due to piping restrictions and space constraints in industrial plants, the flowmeter is not always installed at the ideal location. In this situation, the calibration factor plays an important role in improvement of the flowmeter accuracy. In present study, with the aid of CFD simulation, using Reynolds stress model (RSM) and analytical model of ultrasonic cross-correlation flowmeter, the required calibration factor for a UCCF was proposed in terms of flow Reynolds number in range of 0.63×10^4 to 3.16×10^5 at different locations of flowmeter. The simulation results show that by increasing the flow Reynolds number, the calibration factor increases. Moreover, by increasing the straight pipe length at the upstream of the flowmeter, the calibration factor firstly decreases and then increases.

کلمات کلیدی:

Ultrasonic cross-correlation flowmeter, Calibration factor, CFD simulation

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