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عنوان مقاله:

Experimental Study of a Wire Coil Tube Insert for Fouling Mitigation in the Tube Side of a Shell-Tube Heat Exchanger

محل انتشار:

دوازدهمین کنگره ملی مهندسی شیمی ایران (سال: 1387)

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خلاصه مقاله:

Two wire coil tube inserts were used to enhance the heat transfer inside the tubes of shell-and-tube heat exchangers. In this study, two wire coils (FlxRL and Fix01) has been investigated as a fouling cleaners on the internal surface of a tube. When a wire coil tube insert stays in the tube, it enhances the convective heat transfer. Based on an experimental investigation, the effects of this wire coils on the fouling resistance of simulated water in the 56-hour experiment were found the fouling resistance decrease in the enhanced tube with FlxRL to 1/3 of it for plain tube, whiles it does not change in the enhanced tube with Fix01. These phenomena could be because of the vibration character of FlxRL in the direction of the coil axis and radius depends on the water flow rate in tube. The fouling resistance increased for plain tube and enhanced tube with FlxRL. However the slope of this increase (assumed linear relationship) for plain tube is more than enhanced tube. For the fluid velocity lesser than 0.9 m/s, the fouling resistance decrease with a slope equal 1×10-5 and after a sudden decrease, it continues to the same trend with a larger slope (equal 4×10-5) in plain tube. This behavior repeats for enhanced tube with FlxRL by different slopes. The heat transfer coefficients for enhanced tube with FlxRL and Fix01 are almost twice more than plain tube. However Nue/Nup decreases when Re increased. The friction factor for enhanced tubes is about ten fold much more than it for plain tube.

کلمات کلیدی:

heat transfer enhancement, fouling mitigation, friction factor, cooling water, shell-and-tube heat exchanger

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