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Oil-water pre-separation with a novel axial hydrocyclone^{*}

Meili Liu, Jiaqing Chen^{*}, Xiaolei Cai, Yanhe Han^{*}, Si Xiong

Department of Environmental Engineering, Beijing Institute of Petrochemical Technology,
19 Qingyuan North Road, Daxing District, Beijing 102617, China

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Corresponding author.

E-mail address: jiaqing@bipt.edu.cn (J.Q. Chen), hanyanhe@bipt.edu.cn (Y.H. Han)

Abstract: A novel hydrocyclone with guide vanes, named as axial hydrocyclone (AHC), is designed to tackle the problem of oil-water separation faced by most mature oilfields. Optimal design of the AHC is carried out by using numerical methods. The effects of guide vanes, cone angle, tapered angle and overflow pipe on the oil-water separation are discussed in this paper. The results show that a double swirling flow is generated in the tapered section where oil-water separation occurs. Both the cylindrical and the tapered section have important influences on AHC performance. On the basis of single factor results, response surface methodology is employed to optimize the AHC design. The experimental results indicate that the novel AHC has an excellent performance for the oil-water separation.

Keywords: Axial hydrocyclone; Oil-water pre-separation; Computational fluid dynamics; Low resistance; Structure design

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