Study on the Mixing Characterisctics of Shear Thinning Emulsion for Enhanced Oil Production in FPSO

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The mixing characteristics of EOR(enhanced oil recovery) emulsion in a tank which was installed in FPSO(floating production storage and offloading) were investigated using a commercial CFD(computational fluid dynamics) software. The EOR emulsion is a non-newtonian fluid which consists of water soluble polymer carried in mineral oil. Complete agitation is required to maintain the stability and prevent settling of the emulsion. In this study, to make proper agitation in the EOR emulsion tank, nozzle mixing method was considered and the effect of circulation rates of emulsion from bottom of the tank was investigated. Additionally, emulsion supply nozzle arrangement was studied. Increasing the capacity of the supply pump increased the mixing rate only in the lower region of the tank so that nozzle mixing method could not generate circulation throughout the whole tank. The CFD simulation results using two types of shear thinning model, Ostwald de Waele model and Bird Carreau model, showed that flow patterns of EOR emulsion have little difference between two models.