Numerical modeling of scour below a sagging pipeline using a two-phase model

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The scour below a sagging pipeline is studied using a k-epsilon flow model and an Eulerian two-phase model embedded in the CFD software FLUENT. Both flow-particle and particle and particle interactions are considered in the model, and bed profile changes are evaluated using a threshold of volume fraction of the sediments. The controlled sagging process includes two steps: (1) the local scour develops around the pipeline (2) the pipeline falls into scour hole after the scour depth reaches around 60% of the diameter of the pipeline. The characteristics of the flow field and the effects of sagging on the scour hole are investigated, and the model is validated using already published data. Three sagging velocities were simulated. The predicted scour profiles generally agree well with laboratory measurements published in the literature, although some discrepancies are evident in the downstream. The final scour profiles simulated were in good agreement with a numerical study reported earlier.

References

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