NUMERICAL SIMULATION FOR OIL SPILL FROM A DAMAGED RISER

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When a riser is damaged, the oil spills to sea. Oil spills cause huge economic losses as well as a destruction of the marine environment. To reduce losses, it is needed to predict spilled oil volume from risers and the excursion of the oil. The present paper simulated the oil spill for a damaged riser using open source libraries, called OpenFOAM.
To verify numerical methods, jet flow and Rayleigh-Taylor instability were simulated.
The oil spill was simulated for various damaged leak size, spilled oil volume rates, damaged vertical locations of a riser, and current speeds. Figure 1 shows the Oil spill process from a damaged riser to free-surface for the standard case.

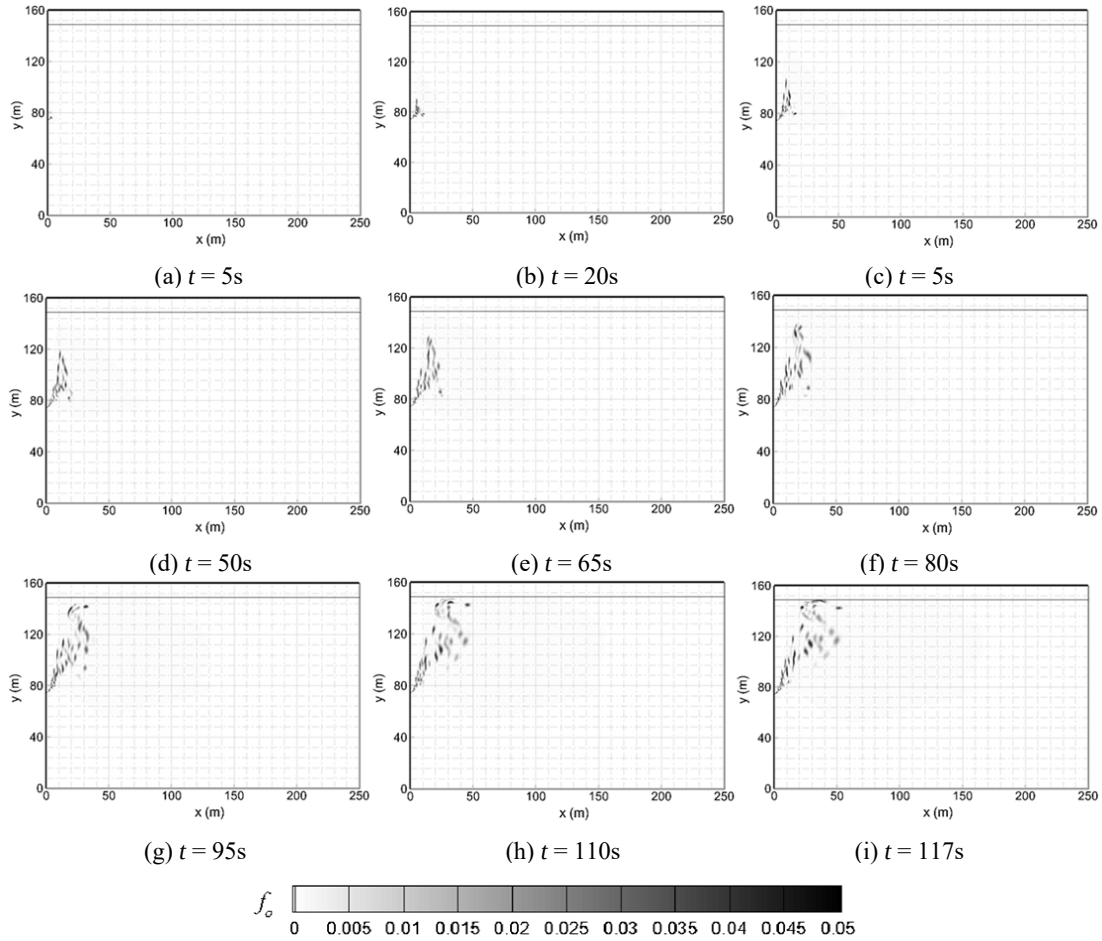

Figure 1: Oil spill process from a damaged riser to free-surface

From results, the maximum excursion of the spilled oil at the certain time was predicted, and a forecasting model for various parameters was suggested. Figure 2 shows the dimensionless time for oil mass which have the horizontal migrate distance when they reach the sea surface.

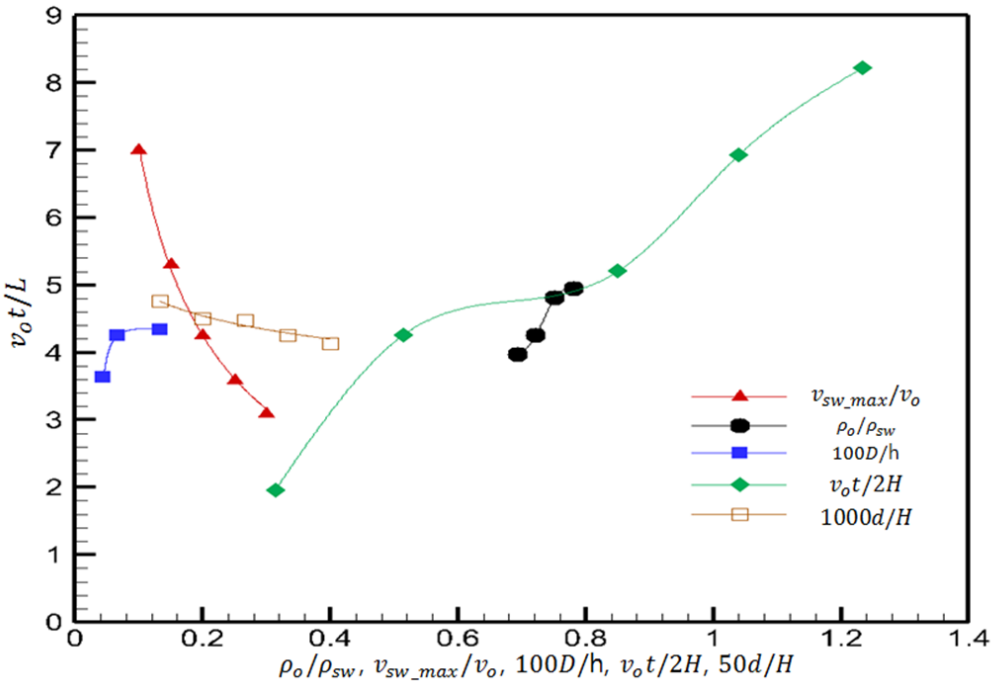

Figure 2: Dimensionless time for oil mass

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