

# **MPS-DEM coupled method for the characteristics of inclined pipe with lateral vibration in two-phase flows**

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## **ABSTRACT**

Deep-sea mining uses risers for mineral transport. However, due to the vibration caused by wind and current <sup>[1]</sup>, the pipeline inclines. Study on the influence of pipe inclination angle on the internal flow field characteristics under such vibration is significant. Considering the two-phase flow in the pipeline and the turbulence caused by vibration, in this paper, a numerical method coupled with moving particle semi-implicit method (MPS) and discrete element method (DEM) is adopted, this method has advantages in dealing with violent flow problem. The MPSDEM-SJTU solver independently developed by the CMHL is used to simulate pipes with different inclination angles under the influence of vibration. According to results of numerical simulation, the pipeline pressure loss fluctuates periodically. In addition, the influence of inclination angle on flow field characteristics such as fluid velocity, particle flow rate and solid particle volume fraction is also analysed. The results of numerical simulation can provide a reference for the optimization of hydraulic lifting system.

## **REFERENCES**

- [1] Avi, U and Avi, L, "Flow characteristics of coarse particles in horizontal hydraulic conveying", *Powder Technology.*, Vol. 156, pp. 43-51, (2018).