# A discrete numerical model of the front region of piping erosion

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## ABSTRACT

Piping erosion is amongst the most dangerous ageing processes affecting embankments dams and dykes [1]. After the erosion is triggered at the downstream side, the pipe propagates upstream (front propagation by backward erosion) while increasing in diameter (lateral expansion by tangential erosion due to the inner turbulent flow). In a recent work we proposed a preliminary discrete numerical model of the soil–pipe interface at the front region [2]. The model was developped with an in-house 2D code based on the Discrete Element Method (DEM) coupled with the Lattice Boltzmann Method (LBM), for the decription of the granular- and fluid phase, respectively (cf [3]). Based on this preliminary work, a whole model of the front region has been developed and is presented herein. The results are reported of an extensive parametric analysis performed with this model. Some conclusions are drawn with regards to the kinetics of the backward erosion process and on the main resistance and degradation mechanisms driving the upstream propagation of the front. The general code architecture is also discussed, along with the technical solutions enabling an effective implementation of the hydro-mechanical coupling.

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