IT Services

Case Study

BlueBEAR provides a substantial computing resource that properly supports the research work of research staff and students at Birmingham. It provides a cost effective facility that optimises the effectiveness of research and ensures the University continues to be a world-class academic learning and research environment.

Coupled DEM-LBM Simulation of Pipe Leakage Problem

Background

Pipe leakage problem has stimulated great interest to researchers not only because it is of special importance in underground environment and foundation engineering, but also due to its complexity and research challenges it poses.

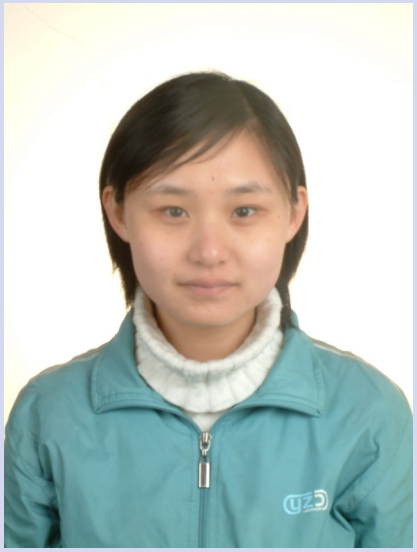
In the vicinity of the pipe leak, motion of soil particles is controlled by not only body forces and particle-particle interactions, but also hydrodynamic forces generated by fluid. On the other hand, fluid pattern can be greatly influenced by the presence of soil particles, often exhibiting complicated turbulence phenomena.

Methodology

A numerical simulation technique coupling Discrete Element Method (DEM) and Lattice Boltzmann Method (LBM) is regarded as a powerful and flexible tool to investigate the underlying mechanisms of the pipe leakage problem. This technique enables one to capture the physical behaviours at the area of intensive fluid-particle interactions with a relatively high resolution. A large computing capability is required.

Results

Numerical simulation results have been compared qualitatively with laboratory findings, which suggest that the proposed coupling technique is capable of describing the main features of the pipe leakage problem, and it can be regarded as a promising tool for further parametric study. Parallelisation is also expected in a future stage to improve the computational efficiency.



Client Profile

Xilin Cui
School of Civil Engineering
University of Birmingham
Edgbaston
B15 2TT

Contact Details
Email: xxc790@bham.ac.uk

Product Used
Intel Fortran f77/f90 compiler for serial code

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Contributors
Mr. Jun Li, Prof. Andrew Chan, Dr. David Chapman, Dr. John Bridgeman

UNIVERSITY OF BIRMINGHAM

For more information:
BEAR, IT Services
Elms Road Computer Centre (G5)
Edgbaston
Birmingham B15 2TT
Tel: 0121 414 5877
Email: bearinfo@contacts.bham.ac.uk
Website: www.bear.bham.ac.uk