Journal of Zhejiang University-SCIENCE A (Applied Physics & Engineering)

Visualizing the dynamic progression of backward erosion piping in a Hele-Shaw cell

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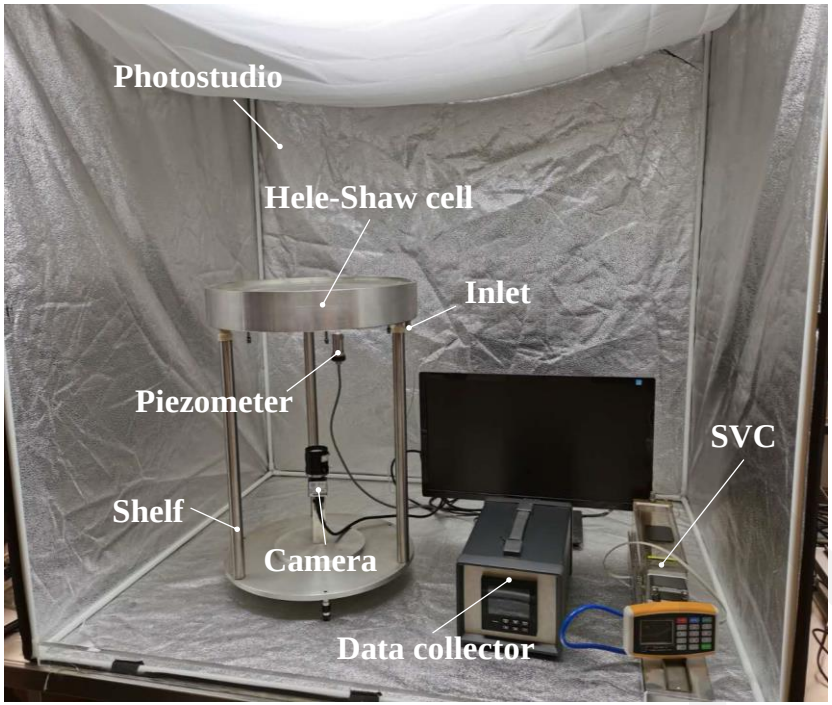
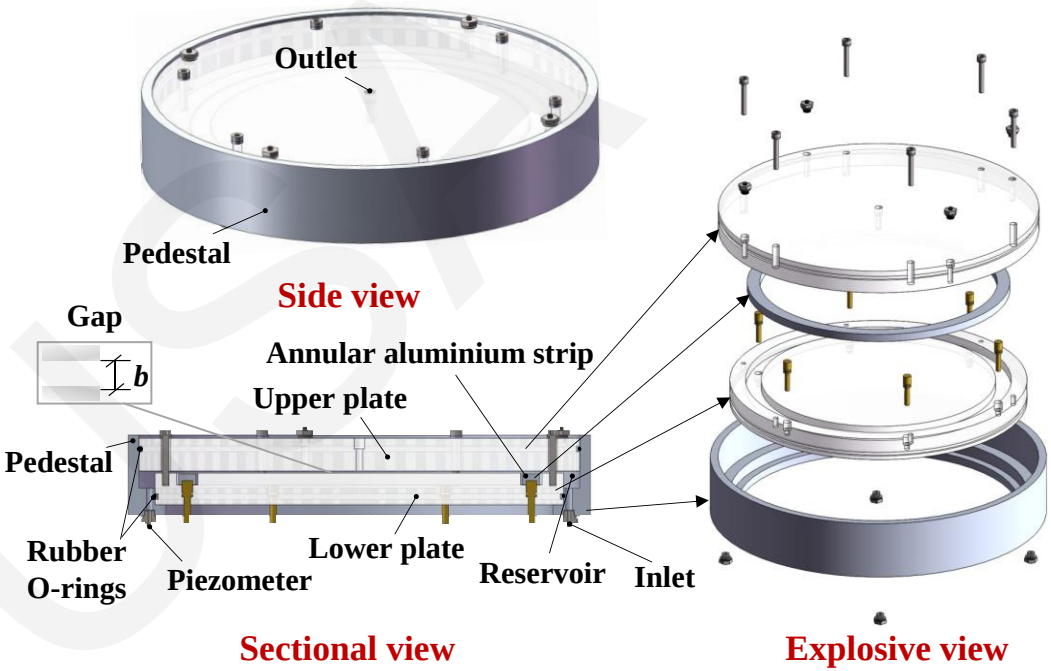
Cite this as: Gang ZHENG, Jing-bo TONG, Tian-qi ZHANG, Zi-wu WANG, Xun LI, Ji-qing ZHANG, Chun-yu QI, Hai-zuo ZHOU, Yu DIAO, 2022. Visualizing the dynamic progression of backward erosion piping in a Hele-Shaw cell. *Journal of Zhejiang University-SCIENCE A (Applied Physics & Engineering)*, 23(11):945-954. https://doi.org/10.1631/jzus.A2100686

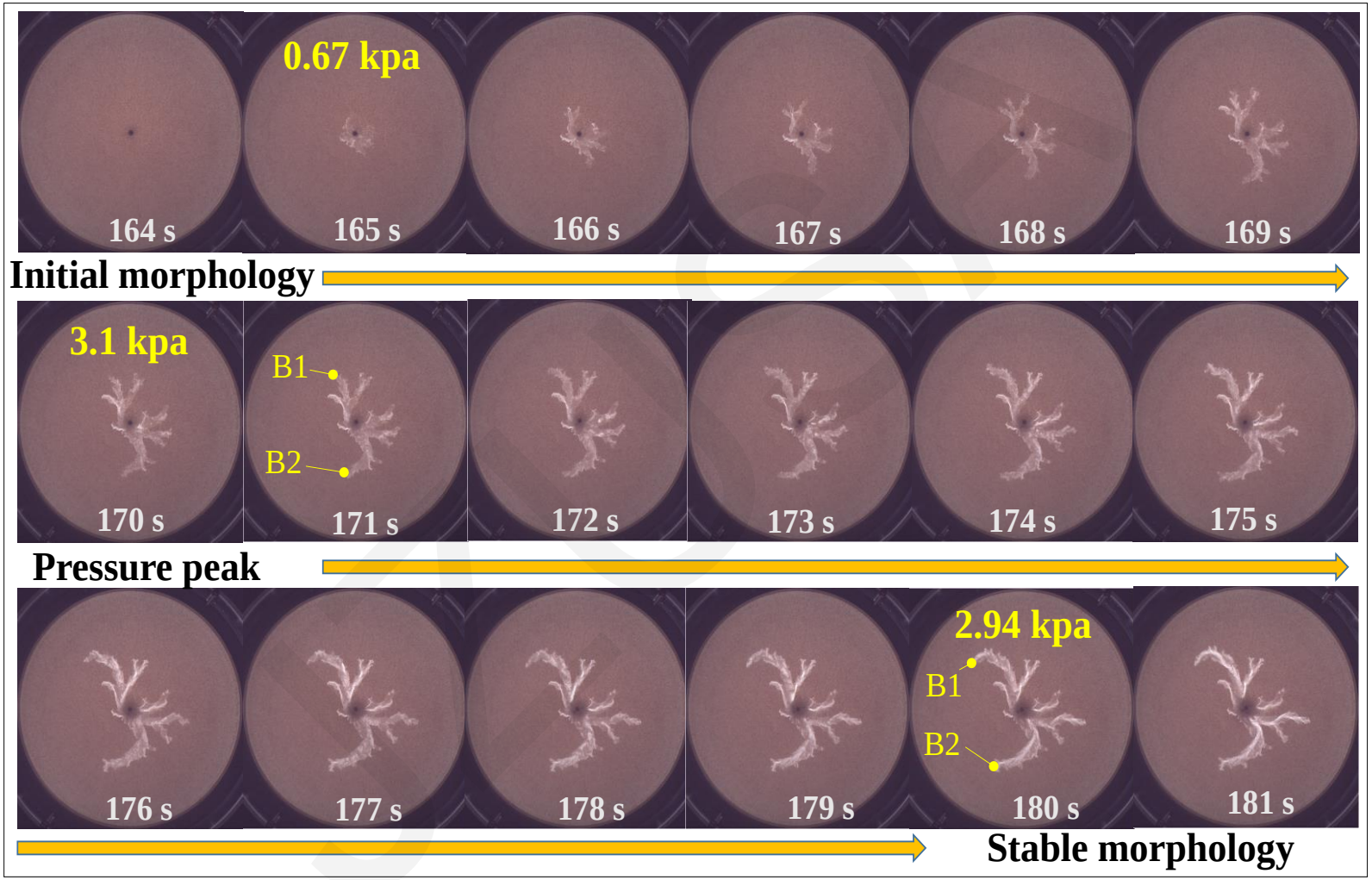
Hele-Shaw Test





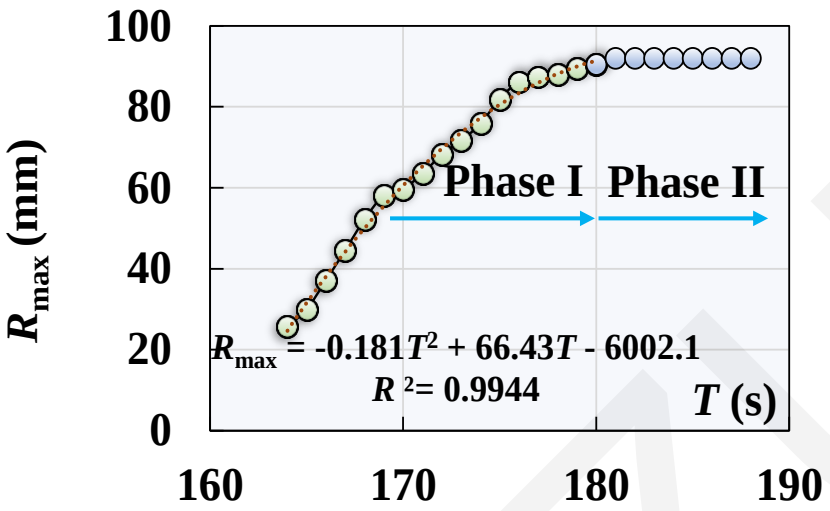
- A Hele-Shaw cell was developed to visualize the dynamic progression of BEP

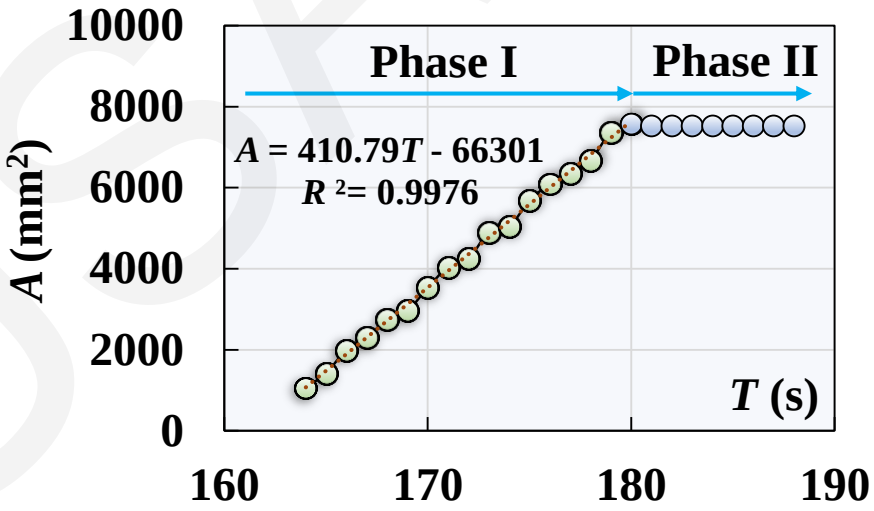
Test results



- Morphology and Process of Erosion observed in a typical test

Test results





- Variations in maximum erosion radius R_{max} and erosion area A with time

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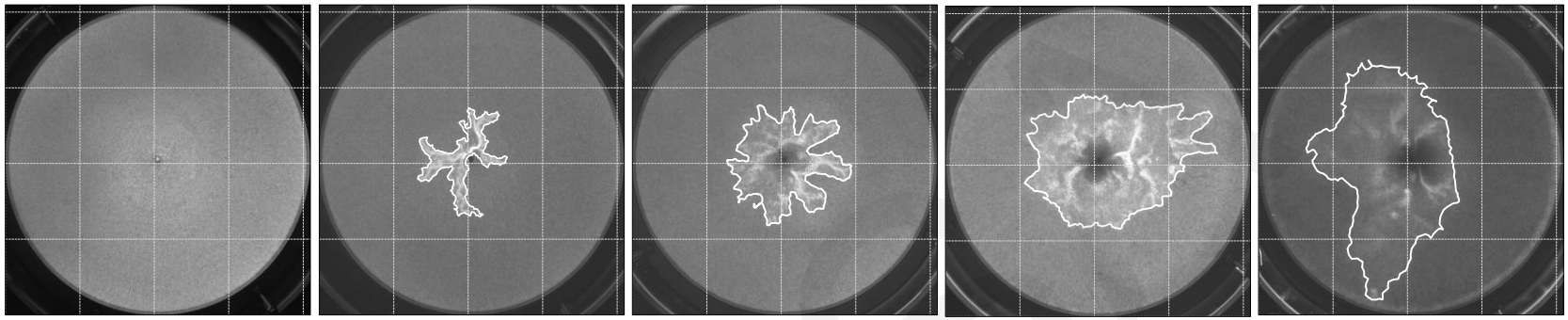
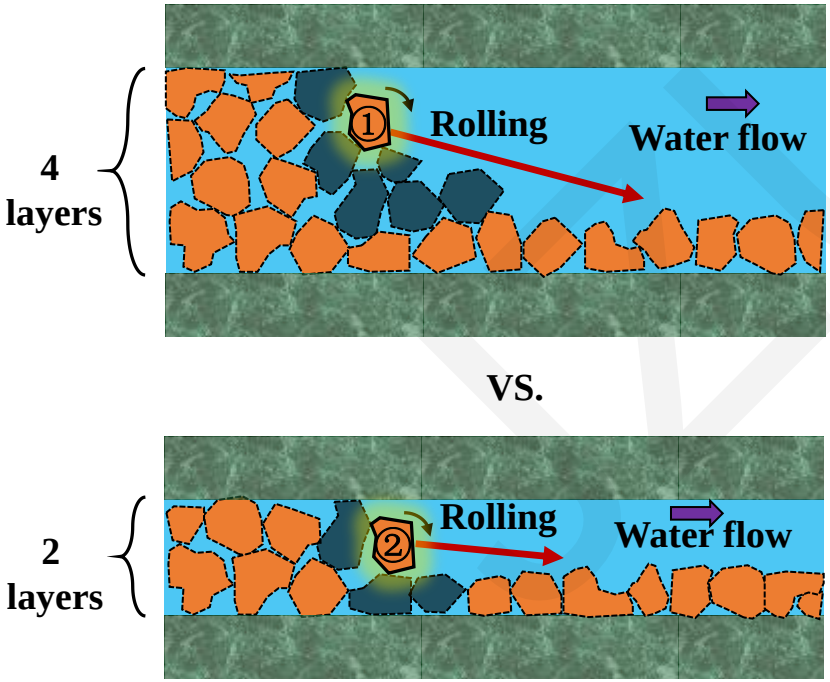
Impact of sample thickness



b=0.25 mm | *b*=0.50 mm | *b*=0.70 mm | *b*=1.00 mm | *b*=1.50 mm



- Sand grains in a thicker sample may exhibit higher mobility

Conclusions

1. The process of BEP observed in a uniform, porous medium driven by a sudden flow of water can be divided into a piping progression phase and a piping stabilization phase.
2. The morphologies of erosion under different fluxes of water indicated that a higher flux of water may produce more branched patterns when the gap was not too wide.
3. The granular system of a thicker sample has more degrees of freedom, which increases the mobility of the sand grains.

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