Contribution ID: **144** Type: **Oral Presentation**

Inertial solution for high-pressure-difference pulse decay measurement through microporous media

Monday, 22 May 2023 13:45 (15 minutes)

We present a theoretical asymptotic solution for high-speed transient flow through micro-porous media in this work by considering the inertia effect in the high-pressure-difference pulse decay process. It includes all three gas related effects, that are the inertia effect, the slippage effect, and the compressibility effect. Capillaric model, in which a bundle of straight circular tubes whose radius is much smaller than length is used to represent the internal structure, is adopted and the flow is described by the unsteady-state incompressible Navier-Stokes equation with mean density in two-dimensional case, capturing the main characteristic of mass flow rate. By order of magnitude analysis and asymptotic perturbation, our inertial solution along with its dimensionless criterion for high-pressure-difference pulse are derived. The theoretical results are verified using our self-built experimental platform, by comparing the permeabilities calculated by our inertial solution and the benchmark steady-state measurement. Our inertial solution can shorten the measurement time and is expected to be used in measurement of extremely low-permeability samples.

Participation

In-Person

References

MDPI Energies Student Poster Award

No, do not submit my presenation for the student posters award.

Country

China

Acceptance of the Terms & Conditions

Click here to agree

Energy Transition Focused Abstracts

Primary authors: WANG, Moran (Tsinghua University); ZHIGUO, Tian

Presenter: ZHIGUO, Tian

Session Classification: MS21

Track Classification: (MS21) Non-linear effects in flow and transport through porous media