Contribution ID: **557** Type: **Oral Presentation**

Numerical simulation of Krauklis wave propagation in complex 2D fracture systems

Wednesday, 21 May 2025 12:05 (15 minutes)

Recently, Krauklis waves (Krauklis, 1962)—guided waves that propagate mostly as pressure pulses within fluid-filled, high-permeability fractures—have gained attention as a geophysical tool for subsurface fracture characterization. Strongly dispersive velocity and attenuation of these waves are sensitive to the hydraulic conductivity (permeability) of the fractures. This property may give Krauklis waves advantages over other types of fracture guided waves and body waves for probing the connectivity of the fracture, because the latter are sensitive to the local permeability of the fractures (via local fracture compliance) that may not reflect the actual reservoir permeability. However, fractures in rock exist at many scales, forming a complex network including microcracks within the rock matrix. In such a system, Krauklis waves can be quickly scattered, attenuated, and converted to body waves. In this research, the behavior of Krauklis waves in a variety of complex fracture systems is examined, using a 2D time-harmonic boundary element method. The local interactions between fluid-filled compliant fractures and the rock matrix are modeled via a poroelastic linear-slip interface (seismic displacement-discontinuity boundary) model, which allows efficient computation of the complex interactions between the waves and the fractures (Nakagawa,2024).

Country

USA

Acceptance of the Terms & Conditions

Click here to agree

Student Awards

I would like to submit this presentation into the InterPore Journal Student Paper Award.

Water & Porous Media Focused Abstracts

References

1. Krauklis, P. V. (1962). On some low-frequency vibrations of a liquid layer in an elastic medium. Journal of Applied Mathematics and Mechanics, 26(6), 1685-1692.; 2. Nakagawa, S. (2024). Krauklis wave propagation within a complex fracture system: Modeling via a two-dimensional time-harmonic boundary element method. The Journal of the Acoustical Society of America, 156(1), 610-622.

Primary author: NAKAGAWA, Seiji (Lawrence Berkeley National Laboratory)

Presenter: NAKAGAWA, Seiji (Lawrence Berkeley National Laboratory)

Session Classification: MS03

Track Classification: (MS03) Flow, transport and mechanics in fractured porous media