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Crack deflection in brittle media with heterogeneous interfaces and its application in shale fracking

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Highlights

- The critical conditions in which a hydraulic crack deflects into weak interfaces and exhibits a dependence on crack-surface friction and crustal stress anisotropy are given in explicit formulae.
- With increasing pressure, the hydraulic crack in shales may sequentially undergo friction locking, mode II fracture, mixed mode fracture.
- Mode II fracture dominates the shale hydraulic fracturing process and the impinging angle between the hydraulic crack and the weak interface is the governing factor for crack deflection.

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