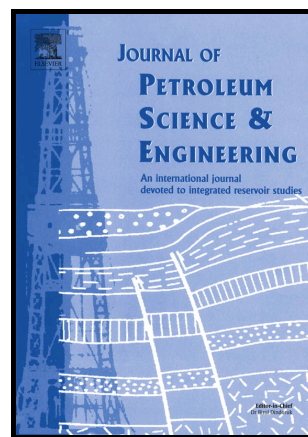


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Pressure Pulse-Decay Tests in a Dual-Continuum Medium: Late-Time Behavior

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Pressure Pulse-Decay Tests in a Dual-Continuum Medium: Late-Time Behavior

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Abstract

The pressure pulse-decay test has been one of the most widely used techniques to measure permeability for low-permeability rocks including shale, largely because relatively simple analytical solutions to fluid flow in a rock sample (characterized as a single continuum) exist for analyzing late-time test data. This work develops a new analytical solution for analyzing late-time pulse-decay test data for dual-continuum rock samples, motivated by the possibility that shale matrix (not including fractures) may exhibit dual- or multiple-continuum gas-flow behavior owing to its wide spread pore size distributions and property differences between organic and inorganic components of the shale matrix. This issue has important implications for characterizing and modeling gas flow in shale, because a dual-continuum medium involves more flow parameters and requires more complex modeling approaches than a single-continuum medium. Our new analytical solution shows that the relationship between gas pressure measurements from a pulse-decay test and permeability remains the same for both single- and dual-continuum systems, suggesting that shale-matrix permeability data in the literature, previously obtained from pulse-decay tests, are valid although the corresponding shale samples

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