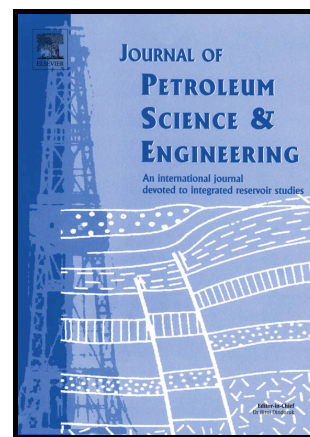


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An improved capillary pressure model using fractal geometry for coal rock

Pengcheng Liu^{a*}, Zhe Yuan^a, Kewen Li^b

^aSchool of Energy Resources, China University of Geosciences(Beijing), China

^bDepartment of Energy Resources Engineering , Stanford University, United States

*Corresponding author. Tel.: +8610 13522168398. lpc@cugb.edu.cn

Abstract

Based on fractal geometry and the “matchstick” tubes model, an improved capillary pressure model was theoretically derived to assess capillary pressure data for coal. The model was based on fractal geometry and the “matchstick” tubes model. Our improved model can be simplified as Li model and Brooks-Corey (B-C) model when the fractal dimension and tortuosity parameter take specific values in coal porous media. Furthermore, the capillary pressure data of different coals samples collected in the LZ Coal Mine in China were measured employing mercury intrusion method, and the heterogeneity of typical coal samples were evaluated using the pore volumetric percent curves and SEM images. The matching results of the B-C model, Van Genuchten (V-G) model, Li model, and our improved model were assessed in comparison with the test data. The comparison indicated that our improved model had better agreement with the test data relative to the conventional models.

Keywords: Coalbed methane; Coal; Capillary pressure; Fractal; Tortuosity

Nomenclature

ϕ	porosity
a	a unit's length of the fractal object
V_p	pore volume
λ	pore size distribution index
θ	contact angle
S_w	wetting phase saturation
S_{wd}	normalized wetting phase saturation

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