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1 **A fractal production prediction model for shale gas reservoirs**

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9 **Abstract**

10 A production forecasting model for shale gas reservoirs is proposed based on the
11 continuum medium theory (organic/inorganic matrix) and discrete fracture model
12 (fracture system). The fractal property of the pore size distribution of shale matrix is
13 considered. The stability and accuracy of the model are successfully validated with
14 the field data. Variations of different flow mechanisms during the exploitation of shale
15 gas are investigated. The sensitivities of gas production to the pore size distribution of
16 shale matrix, natural fracture parameters and hydraulic fracture parameters are
17 analyzed. Our results show that: (1) The contribution of the convective flow and
18 surface diffusion to total gas flow increases with the depletion of shale gas, while that
19 of the bulk diffusion and Knudsen diffusion decreases gradually. (2) Among the
20 fractal pore-size parameters, the maximum inorganic pore diameter has the most
21 significant impact on the cumulative gas production of up to 13.9%. (3) After the
22 natural fracture number increases to a certain extent, gas production increases slowly
23 even if more natural fractures exist in the reservoir. The complex fracture network is
24 beneficial to increase shale gas production. (4) The cumulative gas production rises as

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