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Experimental simulations on coal particle migration through the reservoir and wellbores during coalbed methane production

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Coalbed methane (CBM) is one of the most important unconventional natural gases in the world. During the production of CBM, some coal particles will migrate through the reservoir to the bottomhole, some of them will be produced to the surface with the produced water and some particles will settle down in the wellbore. All the process has great effect on gas production. In order to study the transport mechanisms for coal particle in the reservoir and its settling down in the wellbore, a series of experiments were conducted. The coal-packing models were used to simulate the particle migration in the coal reservoir under different flow rate to measure the critical flow rate for particle migration for different models. The particle size distribution of the produced coal were analyzed by the Laser Particle Size Analyzer. In order to simulate the flow properties of coal particles with water, a new experimental setup was designed, which include supplying system of water and pressure and acquisiting and processing system of data and image. Experiments show that the coal particle production is related to the flow rate and the permeability change of the coal-parking models; only some small size coal particles can migrate through the model and be produced out. The highest particle size is related to the permeabilty of coal-parking models and the fluid flow rate. There is a critical velocity corresponding to coal particles of different meshes by varying the experimental conditions. Particle size, the shape of particles and the flow velosity have effect on settling down of particles in the verticle wellbore. The results can provide some basis for the production plan optimization of coalbed wells.

Biography

Renyuan Sun has completed his PhD in 2005 from Tianjin University, China. He is a Professor of Petroleum Engineering in the School of Petroleum Engineering, China University of Petroleum. His research interests include unconventional oil & gas development, enhanced oil & gas recovery and physical oil production. He has published more than 80 papers in reputed journals.

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