Contribution ID: **307** Type: **Poster**

Micro-scale effect of CO2 diffusion on two-phase flow in dual-porosity of tight oil reservoirs

Tuesday, 15 May 2018 18:30 (15 minutes)

Carbon dioxide (CO2) diffusion in dual-porosity plays a great important role for effective flow in tight oil reservoir. The CO2 diffusion coefficient in matrix is different with the coefficient in fracture because of micro-scale effect. Matrix diffusion coefficient and fracture diffusion coefficient was introduced and respectively used into matrix flow model and fracture flow model. Using pressure drop method, matrix diffusion coefficient in tight porous media was determined by soaking the oil-saturated core in CO2 filled container with constant temperature. This paper developed a two-phase flow model in dual-porosity media coupling with two CO2 diffusion equations, and solved by Finite Difference Method (FDM). To reveal the scale effect, the results of two different numerical models were compared: (1) matrix diffusion coefficient equals to fracture diffusion coefficient; (2) matrix diffusion coefficient differ to fracture diffusion coefficient. Finally, this study verified the micro-scale effect on fluid flow in tight formations.

References

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Session Classification: Poster 2

Track Classification: MS 1.01: Multi-scale Particulates Transport through Porous Media Saturated with Multi-Phase Fluids