

The effect of flowing small particles on flow characteristics and closure of pore in porous media

*Naoki Tanimoto¹, Hitoshi Mikada¹, Junichi Takekawa¹

1. Kyoto University Graduate School of Engineering Civil and Earth Resources Engineering Geophysics Lab

In the production of fluid resources from subsurface reservoir, sanding is the most problematic phenomena which could prevent effective production and sometimes chokes the flowline. The cause of the phenomena is thought as the detachment of sand particles in the matrix of formation to flow into pores of reservoir. These sand particles reduced the permeability of porous flow in the formation and could result in the decrease of production. To evaluate “sanding”, it is needed to find the mechanism of this. But it is difficult because many factors affect this phenomenon, e.g. fluid viscosity, shape of sand particles. So, we investigate the mechanism of “sanding” using numerical simulations.

We investigate the effect of some factors; viscosity of flowing fluid, shape of sand particles, and the velocity of fluid. We found that permeability is dramatically decreased by closure of fluid pass when high viscous fluid flows in porous media. In terms of the shape of sand particles, square grains suppress the probability of closure of flow pass because square particles can change the length of particle orthogonal to flow direction by rotation. On the other hand, the velocity of fluid does not affect the decrease of permeability and the probability of closing so much. The decrease of permeability is almost the same among all velocity situations.

Keywords: permeability, sand particles, particle method