Séminaire de mathématiques et leurs applications

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Titre: One-dimensional model of two-phase fluid displacement in a slot with permeable walls.

Résumé: Mathematical simulation of a hydraulic fracturing process involves the step of computation of proppant transportation in the cavity of the fracture. One of the important phenomena influencing the fracture growth is a non-uniform two-dimensional proppant distribution inside the fracture. In particular, too high concentration of proppant at a certain location may cause formation of a low-permeable steady plug inside the fracture. The plug hampers the flow of fracturing fluid, which in turn slows down or even stop the process of fracture propagation. The 2D-modeling of the proppant transportation require significant computational efforts which raises the demand to simpler models, although taking into account the main features of the process. The 1D model of fracture propagation is presented, which accounts for both the heterogeneous proppant distribution and the influence of the proppant plug formation to the fracture growth. The advantage of proposed approach is the reduction of dimension of the problem and possibility of a qualitative description of the process.