On the mixture model of two-phase proppant transport in 1D fracturing flows WEIMING LI, Halliburton — A mixture model of two-phase fluid flow is derived for proppant transport in 1D hydraulic fracturing. The governing equations of the model consists of the mass balance equations for the mixture and the proppant phase, the momentum equation for the mixture and the constitutive equation between proppant average velocity and fluid average velocity. Mass loss and momentum loss due to proppant settling are considered. One dimensional numerical simulations based on discontinuous Galerkin finite element method in space are performed. Both steady cases and transient cases are compared with available analytical solutions or manufactured solutions. Predicted numerical results agree well with exact solutions. This one dimensional two-phase model captures necessary proppant flow phenomena in hydraulic fracturing and also provides numerical efficiency and accuracy.

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