It is well known that there are many complicated factors involved in the hydraulic fracturing process, particularly the pressure and temperatures associated with the depth of operations. These conditions make field and experimental measurements both expensive and difficult to acquire. Numerical modelling provides a cost-effective approach to experimenting with different treatment options before hydraulic fracturing is applied in the field. However, the combination of solid proppant particles suspended within a fluid is still a challenge to model numerically. This is particularly true for large systems exposed to changing environmental conditions.

Many previous numerical works (e.g. Ribeiro and Sharma (2013)), assume that the working fluid used in a fracturing treatment has constant material properties. In reality, properties such as viscosity and density can change significantly over the temperature range observed within a stimulation treatment.

This study aims to construct a numerical approach for modelling suspensions exposed to a temperature gradient. Focus is given to changes in the transport of the solid phase (proppant) by the fluid.