**Motivation**

- **Numerical Study of Crossflow Enhanced Microfiltration of Oil-in-Water Emulsions**
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- **Theory and Numerical Method**
  - Solver: FLUENT.
  - Supplemented by: UDF programming (C)
  - 3D-simulations of incompressible Navier-Stokes.
  - Interface tracking: Volume of Fluid (VOF).

- **Results: Effect of Transmembrane Pressure and Shear Rate**
  - Low shear rate and high trans-membrane pressure: Droplet goes through.
  - High shear rate and high trans-membrane pressure: Droplet breaks up.
  - Low shear rate and low trans-membrane pressure: Droplet is rejected.
  - High shear rate and low trans-membrane pressure: Droplet is rejected.

- **Results: Effect of Viscosity Ratio**
  - Critical pressure at zero shear rate is independent of viscosity ratio.
  - Critical pressure increases with viscosity ratio.
  - Highly viscous drops break at lower shear rates.
  - Highest deformation before breakup happens for medium viscosity ratios.

- **Results: Effect of Material Parameters**
  - Drops with high contact angle and high surface tension have higher critical pressure.
  - Drops of high contact angle and low surface tension break more easily.

- **Important Conclusions**
  - Behavior of a single droplet on a pore in crossflow microfiltration is one of the following: Permeation, Rejection, Breakup.
  - Critical pressure for crossflow microfiltration increases with shear rate, viscosity ratio, surface tension coefficient, and drop size.
  - Increasing viscosity ratio, contact angle, and size of the drop increases chance of breakup.
  - Increasing the surface tension coefficient decreases chance of breakup.

- **References**