Heat transfer model

Parameters:

Feed rate of plastic

Volume flow rate of plastic

Cross-sectional area of filament

Radius of filament

Outer radius of glass

Heat conductivity of plastic

Specific heat of plastic

Density of plastic

Heat conductivity of glass

Cross-sectional area of glass

Cross-sectional area of nozzle

Input heater power

Melting power

Melting point of plastic

Room temperature

Movement speed of head

Stretching ratio of filament

Temperature gradient in extruder

Vertical heat flow in extruder

Radial heat flow in extruder

Length scale of extruder

Basic relations:

The temperature in the nozzle is then solved as

Guess:

How can this be solved for a specific heat that depends on temperature? Especially at the phase transition?

-Form two solutions and match a boundary condition between them: The temperatures must be equal at the glass transition point.

Unknowns: T\_1, T\_2, T\_3, T\_4, y\_GT

Knowns: T(0), T(L), T\_GT

Temperature distribution is known now. Find the input power:

Convection from a vertical cylinder: