A liquid flowing in a channel has the following velocity profile:







Where z=0 is the wall of the channel (v=0) and 0.10 m is the center of the channel (v=4.5 m/min). (Note that this profile is only for ½ of the channel width, so it is symmetrical around the channel center.)

The shear stress of the fluid (kg/m-min2) has also been measured as a function of the position in the channel and is given below.







1. Using a cubic spline, **model the velocity as a function of position** in the channel. **Provide an appropriate plot showing your model and the data**.
2. Using your model from part A, provide a **model for the shear rate, dVz/dz, as a function of position** in the channel. **Provide an appropriate plot of model of shear rate vs. z**.
3. Using a cubic spline, model the **shear stress as a function of position in the channel**. **Provide an appropriate plot showing your model and the data.**

From your fluid mechanics background, fluids that obey the model, tau = -  dV/dz, are classified as Newtonian fluids if  is a constant.

1. Using your models, **prove/demonstrate whether this fluid behaves as a Newtonian fluid or not**. **Clearly explain/justify your solution using your models** (provide plots, graphs, etc.) **Explain the type of rheological/physical behavior shown by this fluid** and if possible, give examples from food/biological products.