Summary of class on 5/16/18: Snow I
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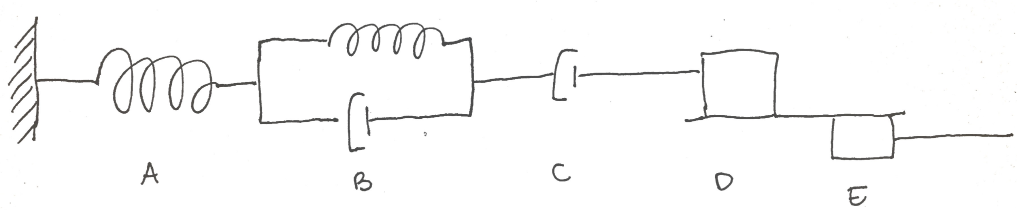
We briefly listed and discussed the important processes that occur in snow including porosity, compaction, recrystallization, phase changes, and boundary layer processes. Then, we analyzed a schematic of snow that represented the different ways snow can deform, as seen in the figure below.



If you exert a force on this system there are several different types of deformation processes that can occur. In part A, modelled by a spring, rapid elastic deformation occurs. In B, modeled by a spring and a dashpot, compression and decompression from the dash pot is transferred and resisted by the spring, so delayed elasticity occurs. In part C, modeled by a viscous dashpot, compression and decompression occurs. In D, the snow acts as a plastic in which the exerted force can cause the material to stretch continuously, like putty. In part E, the material fractures because it experiences too great of a yield stress so it fails.

Next, we discussed when these different types of behavior matter, including the applications of slope stability, avalanche release, forces on objects, snow removal, and sound attenuation. We talked about how differences in snow density can propagate by several orders of magnitude in the corresponding snow properties such as elastic moduli, viscosity (especially), and strength. Lastly, we derived the following constitutive relation for strain rate as a function of shear viscosity and stress tensor:

$\epsilon ij=12\eta[\sigma ij-1-2\eta 3K\sigma kk3\delta ij]$