Explanation of Damping
last revised 23-Feb-06 by TL

Piston Force $F = \Delta p(A)$ Force = Pressure times Area
If Piston velocity v= constant, then flow rate Q=vA=constant. Q can be flow around the piston, through a needle valve, or through an orifice.

1. For the dashpot, there is laminar flow around piston and through the needle valve.

   From the analysis of fluid dynamics, we know that these types of flow mean Δp is proportional to Q. I am not showing this analysis here, but this information is in Fluids Dynamics textbooks. Therefore F is proportional to Q. Therefore F is proportional to piston velocity v.

2. For a typical shock absorber the flow is through one of more orifices.

   From the analysis of fluid dynamics, we know that this type of flow mean Δp is proportional to Q^2. I am not showing this analysis here, but this information is in Fluids Dynamics textbooks. Therefore, F is proportional to Q^2. Therefore F is proportional to piston velocity squared v^2.

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