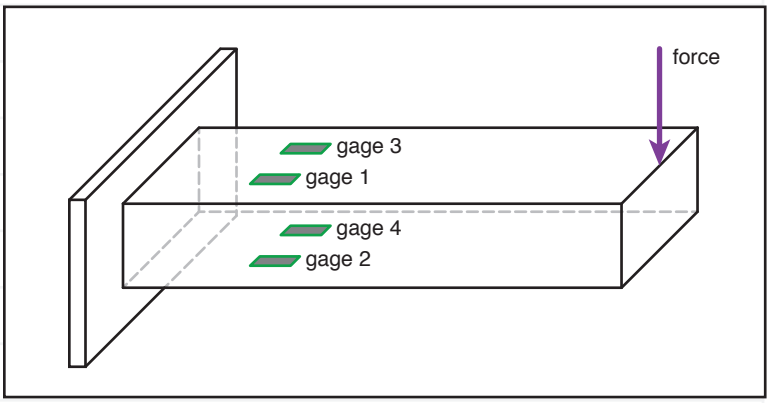
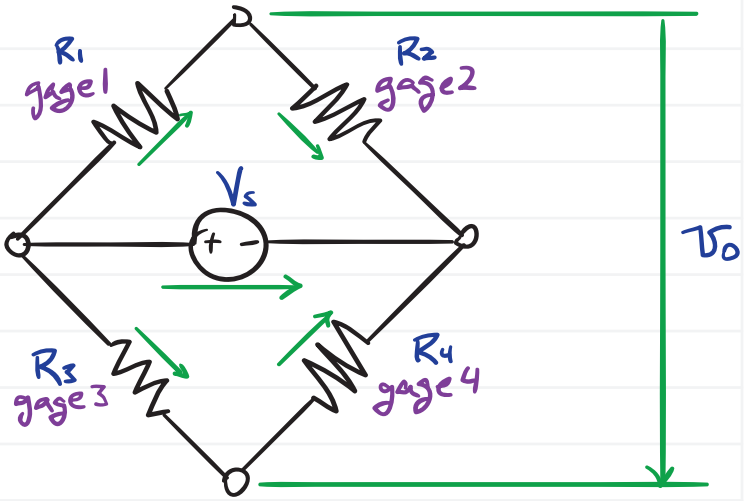
Resistive force transducers

Consider the beam at right with a full-bridge strain gage sensor-transducer.





The applied force stresses the beam axially (tension + compression). The normal stress is (anti) symmetric due to the uniformity of the beam. The strain ϵ is proportional to the normal stress σ, and σ is proportional to the applied force F.

From an analysis of the bridge circuit, we can see that, if the resistors have the same balanced, nominal resistance R, that the change in resistances $\Delta R > 0$ is proportional to the strain ($\epsilon = \frac{\Delta R}{R} / G_f$). In turn, changes in resistance ΔR have been shown to be proportional to the output voltage v_o :