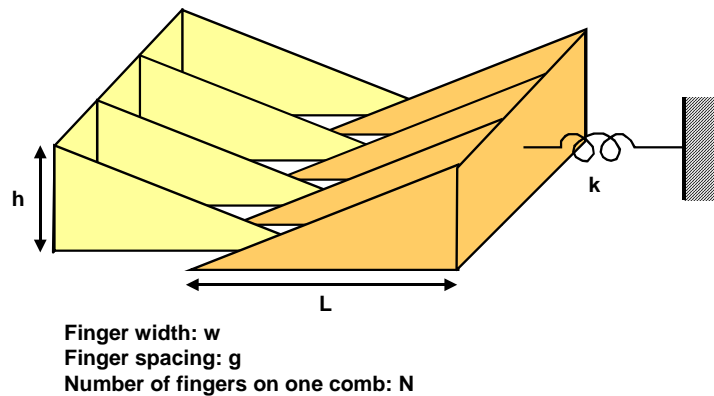


HW #3

1) Consider a “triangular” comb drive shown in the following:



- Derive the expression for electrostatic energy stored in the triangular comb.
- Derive the electrostatic force for the triangular comb drive actuator.
- Does the triangular comb drive have pull-in?
- Derive the transfer function of the triangular comb drive (displacement versus voltage).
- Assume the spring consists of a pair of poly-Si folded flexure beams with $2\ \mu\text{m}$ widths, $2\ \mu\text{m}$ thickness, and $100\ \mu\text{m}$ lengths. What is the spring constant?
- For $h = 10\ \mu\text{m}$, $L = 50\ \mu\text{m}$, initial finger over lap of $0\ \mu\text{m}$, find the force and displacement of the actuator with a bias voltage of $20\ \text{V}$.