Folded-Flexure Suspension Variants

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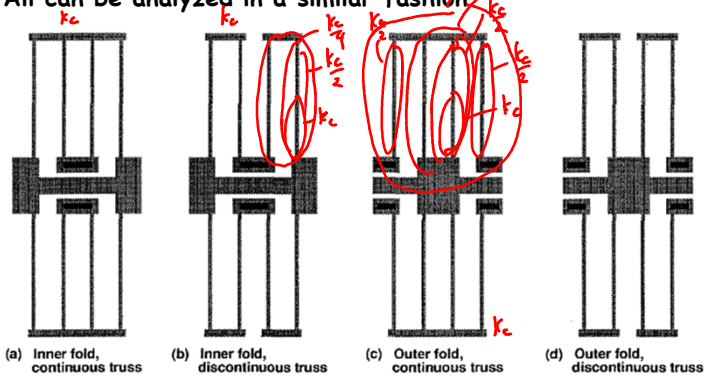
- Below: just a subset of the different versions
- All can be analyzed in a similar fashion



[From Michael Judy, Ph.D. Thesis, EECS, UC Berkeley, 1994]

Folded-Beam Stiffness Ratios

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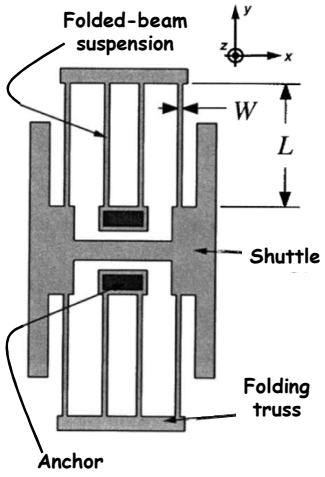

- In the x-direction:

$$k_x = \frac{24EI_z}{L^3}$$

- In the z-direction:
  - Same flexure and boundary conditions

$$k_z = \frac{24EI_x}{L^3}$$

- In the y-direction:

[See Senturia, §9.2] $k_y = \frac{8EWh}{L}$

- Thus: $\frac{k_y}{k_x} = 4\left(\frac{L}{W}\right)^2$ Much stiffer in y-direction!

Folded-Beam Suspensions Permeate MEMS

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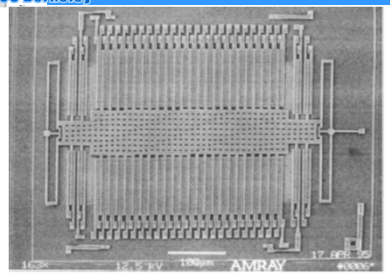
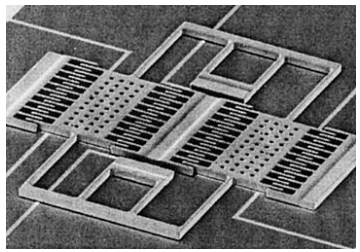
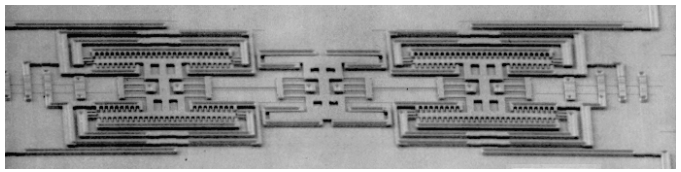


Accelerometer [ADXL-05, Analog Devices]



Gyroscope [Draper Labs.]



Micromechanical Filter [K. Wang, Univ. of Michigan]

Folded-Beam Suspensions Permeate MEMS

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- Below: Micro-Oven Controlled Folded-Beam Resonator