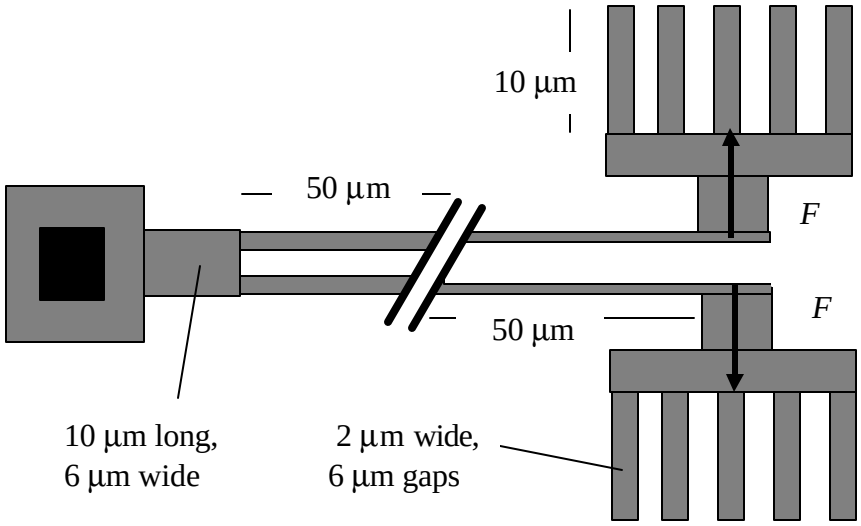
UNIVERSITY OF CALIFORNIA AT BERKELEY
College of Engineering
Dept. of Electrical Engineering and Computer Sciences

Problem Set #4B
Due Thursday, October 30, 2003, 5:00 pm

EECS C245 / ME C218 **Fall 2003**

1. The layout below shows a single-ended, comb-drive tuning fork resonator made from a 2 μm-thick polysilicon film. The length of the tines is 100 μm and their thickness is h = 2 μm in the bending direction for the first 50 μm from the shoulder of the tuning fork, after which the thickness is 1 μm. Make reasonable estimates of the dimensions not given in the drawing; note that the drawing is not to scale.



a) Do the first four Intellisuite™ tutorials. Helpful information is found on the following web pages. It will be time-consuming, but essential for (b)-(e) and useful for your project, too.

1. Intellisuite

http://inst.eecs.berkeley.edu/cgi-bin/pub.cgi?file=intellisuite.help

http://www-bsac.eecs.berkeley.edu/~sunil/EE245/Software/intellisuite.htm

2. Cadence
http://www-bsac.eecs.berkeley.edu/~cadence

http://www-bsac.eecs.berkeley.edu/~sunil/EE245/Section/Cadence/cadence.html

http://www-bsac.eecs.berkeley.edu/~rconant/cadence/cadence_commands.html

3. Sugar
http://bsac.berkeley.edu/cadtools/sugar/sugar/

b) Using Intellisuite, layout this SETF using the built-in MUMPS process using poly-0, anchor, and poly 1.

c) Find the load-deflection curve for a point load F and the displacement of one of

the tines.

d) Find the frequencies and mode shapes for the first five modes of the SETF.
e) Add a reasonable design for the drive and the sense combs to your layout. Find the relationship between the applied AC drive voltage and the displacement, assuming a DC polarization voltage V_P = 5 V. Assume Q = 5000.

***Please post your questions on our newsgroup*:** ucb.class.ee245