1. The layout below shows a single-ended, comb-drive tuning fork resonator made from a 2 \( \mu m \)-thick polysilicon film. The length of the tines is 100 \( \mu m \) and their thickness is \( h = 2 \mu m \) in the bending direction for the first 50 \( \mu m \) from the shoulder of the tuning fork, after which the thickness is 1 \( \mu m \). 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\textsuperscript{TM} 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
   
   \( \text{http://inst.eecs.berkeley.edu/cgi-bin/pub.cgi?file=intellisuite.help} \)
   
   \( \text{http://www-bsac.eecs.berkeley.edu/~sunil/EE245/Software/intellisuite.htm} \)

2. Cadence
   
   \( \text{http://www-bsac.eecs.berkeley.edu/~cadence} \)
   
   \( \text{http://www-bsac.eecs.berkeley.edu/~sunil/EE245/Section/Cadence/cadence.html} \)
   
   \( \text{http://www-bsac.eecs.berkeley.edu/~rconant/cadence/cadence_commands.html} \)

3. Sugar
   
   \( \text{http://bsac.berkeley.edu/cadtools/sugar/sugar/} \)

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