Effect of Cavity Displacements

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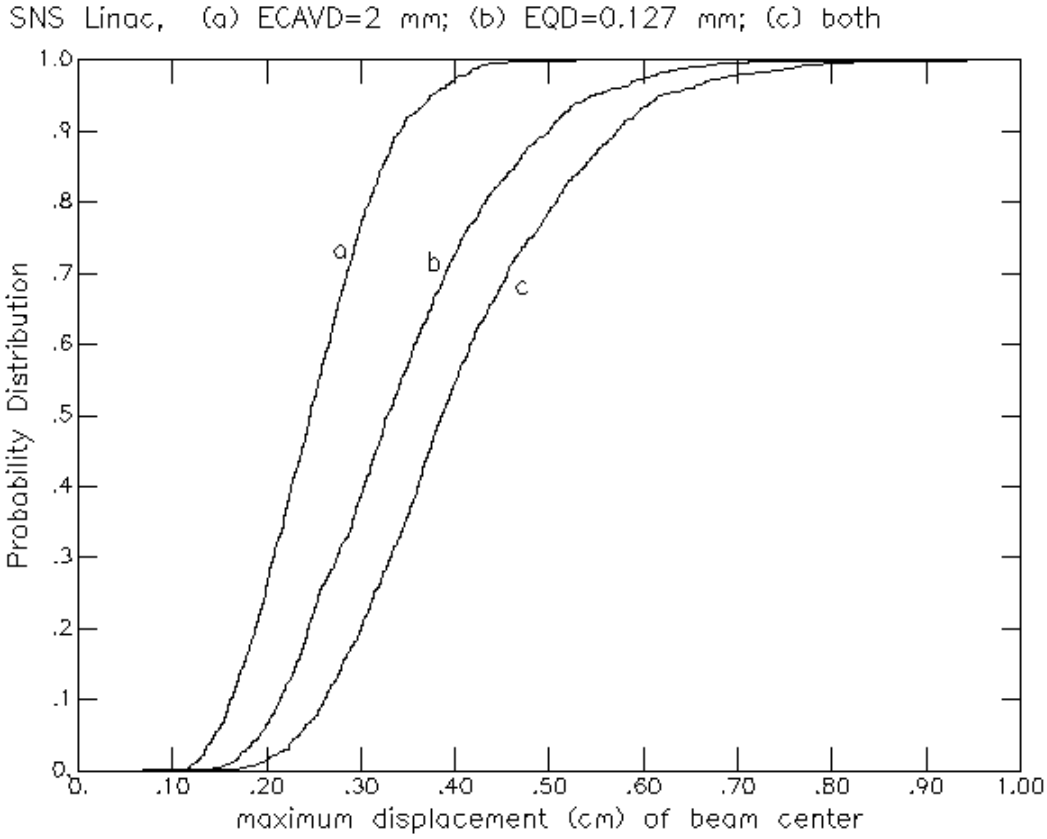
I was asked to see if a displacement tolerance of 2 mm for the superconducting cavities was reasonable. I made 1000 runs with random displacements within this tolerance and saved the maximum beam displacement for each run. Then I made 1000 runs with random errors in the displacements of the quads in the SCL with a tolerance of 0.127 mm (0.005”) to compare the effects of these two types of errors. Below is shown a plot of the probability of the maximum displacement of the beam center being less than the abscissa for these two error tolerances, and one can see that a 2-mm tolerance on the cavity displacements has less effect on the beam displacement than does a 0.127-mm tolerance on the quad displacements. No corrective steering was done. Curve *c* is the result of 1000 runs with both types of displacements included.