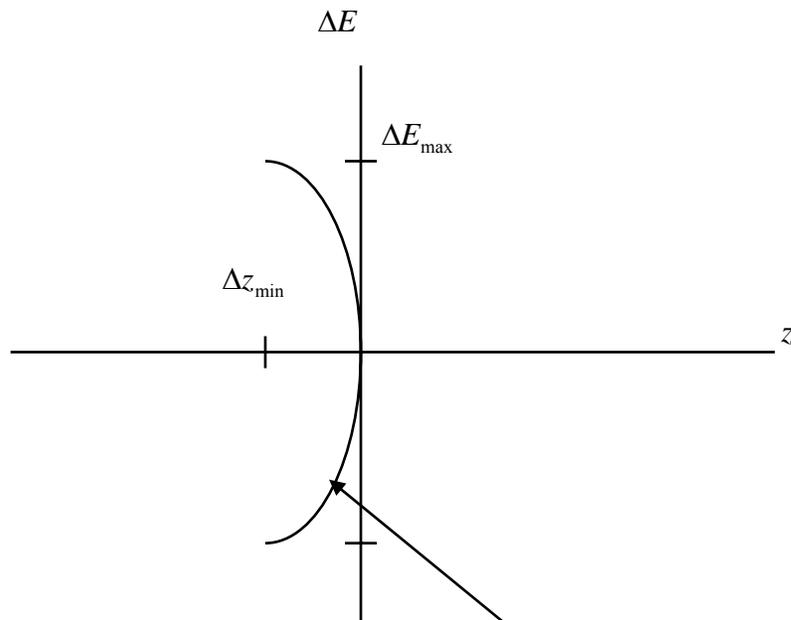# Homework Problems 4

1. Suppose for a moment that one could create a distribution with no intrinsic spread but which had a parabolic distortion in the phase space. Compute the longitudinal emittance as a function of the parabolic distortion. Does your result approach the proper limit as Δz_{min} goes to zero?

$$f(z, \Delta E) = A\delta\left(z + \Delta z_{min}(\Delta E / \Delta E_{max})^2\right)\left[\Theta(\Delta E + \Delta E_{max}) - \Theta(\Delta E - \Delta E_{max})\right]$$

2. Assuming no microphonics, plot β_{opt} and P^{opt}_g as function of b (beam loading), $b = -5$ to 5, and explain the results.

   How do the results change if microphonics is present?