

Part IB Physics B

Classical Dynamics and Fluids — Examples 3 — 2008

Problem grading:

- (A) Problems that can be answered directly by quoting the lectured material or by straightforward calculation.
- (B) Problems that require some algebraic formulation and manipulation as well as calculation.
- (C) Problems which are either harder or longer than (B) problems. You should feel a sense of achievement in completing these.

1. (C) A conducting cone is made from a sheet of metal and has semi-angle α . The tip of the cone is truncated, so that there is a circular hollow rim, over which is stretched a conducting soap bubble. When the cone becomes electrically charged, electrostatic repulsion causes the soap bubble to bulge upwards. For a certain value of the charge the soap bubble completes the cone. What is the semi-angle α of the cone?

[The excess pressure inside a two-sided cylindrical surface of radius of curvature R is $2\gamma/R$, where γ is the surface tension.]

Numerical Answers

Q1. 49.3° .