

Submit paper copies of your solution and email the codes, if any, to the instructor and the TA.

Question 1 (20 points)

A commercially available statically balanced desk lamp is shown in the figure. Its photograph, kinetoelastic interpretation, and a simplified sketch are shown. Your task is to derive relationships among the dimensional parameters of the lamp by assuming linear spring constants of two zero-free-length springs.



Parameters

- k_1 and k_2 are the spring constants of hidden zero-free-length springs connecting DE and FG, respectively.
- AB: Length l_1 with variable orientation θ relative to AD
- BC and BG: Lengths l_2 and l_5 with variable orientation ϕ relative to AD
- AE and AF: Lengths l_3 and l_4 with same constant orientation γ relative to A
- AD: Length l_0

