OPTI 523 – Optomechanical Design and Analysis

Problem 2: Fold flat

Mount a small flat mirror which folds the light path in an interferometer.

Requirements:

First surface reflection
λ = 633 nm
> 90% reflectance
TIS > 1%
Wavefront distortion from mirror < 0.1 wave

10 mm diameter collimated laser beam
90° reflection (45° angle of incidence)
Mounting interface: Aluminum plate
Center of beam is 50 mm above mounting plane

The mirror must be located accurately to 0.5 mm
The angle of the reflected light must be correct to 1 mrad
The light reflected from the mirror be stable to
<0.1 mm position
<1 mrad angle

Design for > 100Hz resonance

Design for survival of:
20 G shock
-20° – 65° C
Design for operation in an industrial environment.

A) Write the requirements for the mirror mount.

B) Perform preliminary design.

a. Specify the mirror
b. Can you use COTS parts (Commercial Off The Shelf)? Specify them
c. Sketch the geometry
d. Write preliminary assembly plan

Show how to estimate performance and survival

C) Complete the design. Provide solution as a technical report.