

Homework – 1

Problem: One of the three landing pads for the Mars Viking lander is shown in the figure with its approximate dimensions. The mass of the lander is 600 kg.

- Compute the force in each leg when the lander is resting on a horizontal surface on Mars. Assume equal support by the pads.
- The actuator is capable of retracting and extending the leg CD between the limits $l_{CD} = 1000 \text{ mm}$ and $l_{CD} = 1500 \text{ mm}$ when unconstrained. Considering the facts that the bottom of the lander is not to touch the surface and the leg CD cannot be positioned beyond the vertical position, find the minimum and maximum values of the x -coordinate of the point C . ($x_{C,min}$ and $x_{C,max}$)
- Determine the forces in each leg as a function of x_C .
- Draw the $F_{CD} - x_C$ and $F_{AC} - x_C$ diagrams for the interval $[x_{C,min}, x_{C,max}]$.
- What are the minimum and maximum values of the forces in the legs?

