Lecture Module - Non-Linear Equations

ME3001 - Mechanical Engineering Analysis

Mechanical Engineering

Tennessee Technological University

Topic 5 - Mechanical Design Problem

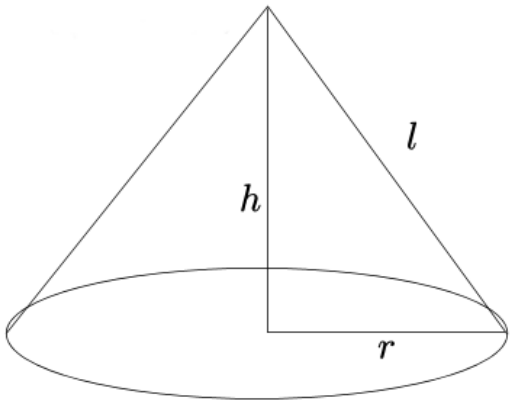
Topic 5 - Mechanical Design Problem

- Problem Statement
- Mathematical Model
- Solution Approach
- Design!

Problem Statement

A Mechanical Design Problem

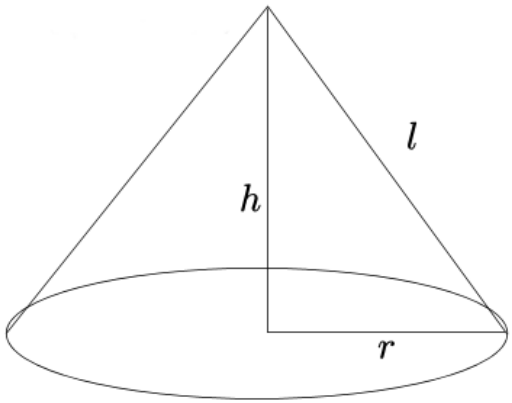
As an engineer you are asked to design a structure. The geometry of this structures is simple but certain properties are critical. Also you want to spend as little as possible on materials.



You are required to design is a cone with a surface area of exactly $25m^2$ to a tolerance of $0.1\ m^2$ and a height of exactly $1m$. Your goal is to find the radius in meters.

Mathematical Model

What is the *mathematical model* of the cone?



surface area, $s = \pi r l = \pi r \sqrt{h^2 + r^2}$
volume, $v = \pi r^2 \frac{h}{3}$

Solution Approach

How are you going to solve this problem?

Design!

How are you going to *design* the cone?