Universiti Malaysia PAHANG
Engineering • Technology • Creativity

NUMERICAL METHODS & OPTIMISATION

Optimisation
Tutorial

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Communitising Technology

Chapter Description

- Aims
  - Apply numerical methods in solving engineering problem and optimisation

- Expected Outcomes
  - Solve engineering problems by using methods for optimisation

- References
  - Steven C. Chapra and Raymond P. Canale (2009), Numerical Methods for Engineers, McGraw-Hill, 6th Edition

Optimisation: Tutorial
By Raihana Edros
http://ocw.ump.edu.my/course/view.php?id=608&notifyeditingon=1

Application in engineering problem: Class activity

Cheh Phey is an engineer. She needs to design a high pressure vessel for ROX Company which is owned by Zi Wei and Poh Chien. The vessel is composed of a cylinder and two hemispheres at its end. Given that when the height varies, find the minimum radius of the vessel with combined volume of 15m³. The volume of vessel can be determined by the following equation:

$$V = \pi r^2 h + \frac{4}{3}\pi r^3$$

Suggest a method that can be used to determine the minimum radius and discuss the results obtained.

Conclusion

- Engineering problems can be solved by using methods for optimisation including Golden-Section Search, Quadratic Interpolation, Newton's and Direct Methods.

Main Reference

Steven C. Chapra and Raymond P. Canale (2009), Numerical Methods for Engineers, McGraw-Hill, 6th Edition

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