Fall 2008
CSE/Math 555: Numerical Optimization Techniques
Course Announcement

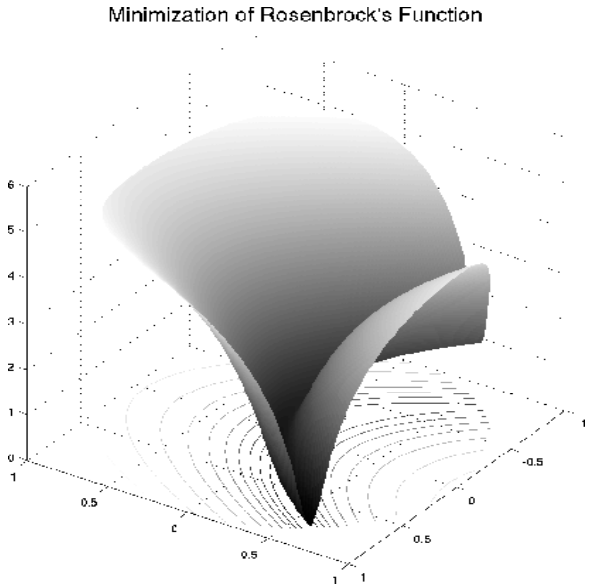
Insructor: Dr. Suzanne Shontz

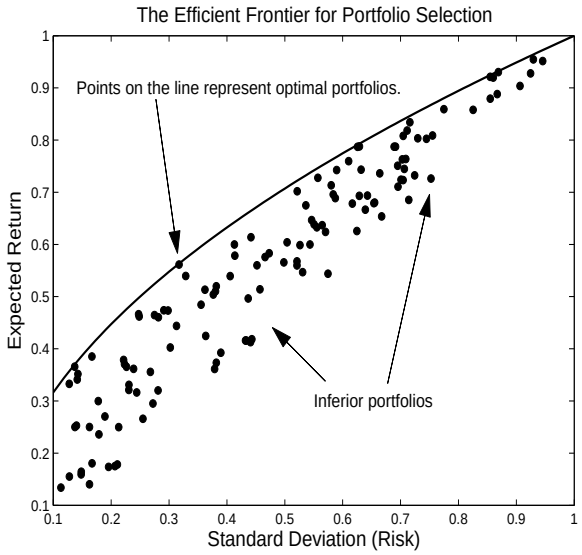
Meeting Time and Place: Tuesdays and Thursdays, 2:30-3:45 PM; 333 IST Building

Schedule number: #170278

Number of credits: 3

Prerequisites: CMPSC (MATH) 456 or instructor approval.





Description: The course will emphasize the design and mathematical analysis of numerical optimization algorithms (including related software issues) and applications. Topics will include: unconstrained optimization methods, automatic differentiation, nonlinear equations, constrained optimization methods, linear and quadratic programming, convex optimization, global optimization, and parallelism in optimization. The course will be lecture-based with homework assignments (comprised of mathematical exercises, algorithmic design, and programming problems) and exams.

Who Should Take This Course?

The course is targeted towards graduate students, researchers and faculty in

- computer science and engineering
- mathematics
- industrial engineering
- other application fields dealing with optimization (such as aerospace engineering, mechanical engineering, chemical engineering, electrical engineering, finance, biology, ...).

Advanced undergraduate students with the appropriate background may also register for the course.

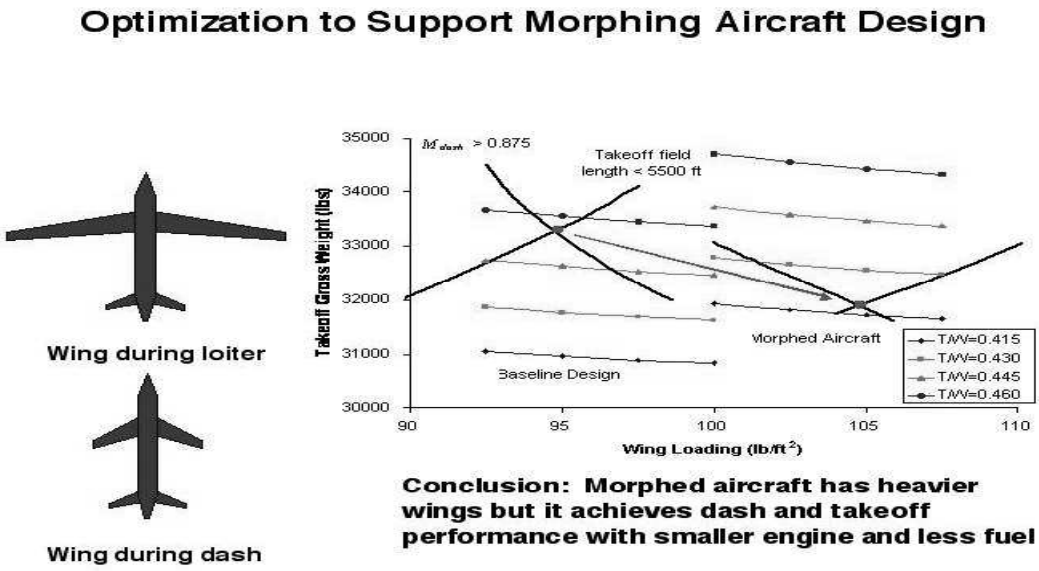


Figure 1: Image Source: http://mdob.larc.nasa.gov/hilites/Hl.03/crossley.jpg.

Textbook: Numerical Optimization by Nocedal and Wright

Course Outline:

- Local and Global Minima
- Steepest Descent and Line Search
- Trust Region Methods
- Conjugate Gradient Methods
- Quasi-Newton Methods
- Automatic Differentiation
- Nonlinear Equations
- Constrained Optimization and KKT Conditions
- Linear Programming: Simplex and Interior-Point Methods
- Quadratic Programming
- Penalty and Augmented Lagrangian Methods
- Sequential Quadratic Programming
- Convex Optimization
- Global Optimization
- Parallelism in Optimization

Evaluation: Students will be evaluated according to the following scheme:

- Class Participation = 5%
- Homework = 35%
- Midterm Exam = 30%
- Final Exam = 30%