

MAT 4380 - Nonlinear Partial Differential Equations

New course, starting Spring 2006

(10 credits, 4 hours of lectures per week, oral exam)

Conservation of mass:

$$\partial_t \rho + \operatorname{div}(\rho u) = 0$$

Conservation of momentum:

$$\partial_t(\rho u) + \operatorname{div}(\rho u \otimes u) + \nabla p = \operatorname{div} \sigma + \rho f$$

Conservation of energy:

$$\partial_t E + \nabla \cdot ((E + p)u) = \operatorname{div}(\sigma u) - \operatorname{div} q + \rho f \cdot u$$

The aim of this course is to provide an introduction to modern methods for studying nonlinear partial differential equations. The content of the course, which can change from semester to semester, is built around some of the following themes:

- Calculus of variations
- Non-variational techniques
- Weak convergence techniques
- Hamilton-Jacobi(-Bellman) equations (viscosity solutions)
- Systems of conservation laws (shock wave solutions)
- Navier-Stokes equations

For more information contact
Kenneth H. Karlsen (CMA)
E-mail: kennethk@math.uio.no