

**MSc Computational Science and Engineering Projects (2009/2010)**  
**Supervisor: Prof. Choi-Hong Lai (Office QM318)**

1. *Scientific computing and algorithms*

This project concerns applications of domain decomposition methods for welding problems. Students will work closely with an industrial partner on the development and tests of domain decomposition methods on Unix systems.

Experience required: F90, numerical methods, partial differential equations.

2. *Parallel Laplace transformation methods for nonlinear convection-diffusion problems*

This project follows on a previous MSc project in the development of advanced Laplace transformation methods for nonlinear problems with applications to either pollution problems or computational finance.

Experience required: F90, numerical methods, partial differential equations.

3. *High order schemes for CFD*

This project concerns the use of high order numerical methods in the understanding of small scale fluctuations introduced into diffusion convection problems.

Experience required: Fortran, fluid mechanics, CFD techniques.

4. *Image processing*

Performance tests of several mathematical models for image denoising.

Experience required: Numerical methods, Java.

5. *Computational Virology and Immunology (System Dynamics)*

Examine the dynamical models of viral infection and the corresponding immunisation policy and strategies. Most of the dynamical models concern coupled differential equations, some linear and some non-linear. Use of numerical methods for solving time-dependent ordinary differential equations is needed.

Experience required: Java and/or Fortran programming skills. Knowledge of solving stiff o.d.e.s.