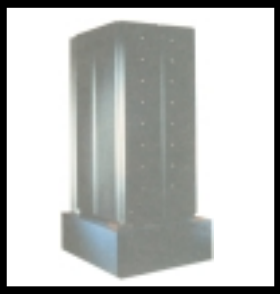
Computational Engineering & Design Centre

Introduction



This centre is based in the Faculty of Engineering and Applied Science at Southampton University. Its aim is to provide a focus for the Faculty's expanding activities in the area of computational modelling of engineering systems. Its work is based on the use of powerful parallel and clustered

CEDC

computational facilities drawing on the existing experience and hardware of the University in this area. The centre is located in a dedicated facility which houses up to 15 researchers working on projects drawn from across all disciplines in the faculty. It is directed by Prof. A.J. Keane and Dr. O.R. Tutty.

Aims and faciliites

The primary aim of the CEDC is to develop and exploit models of engineering systems using powerful computational facilities, i.e., based on models that could not be dealt with by standard desk-top type

CEDC

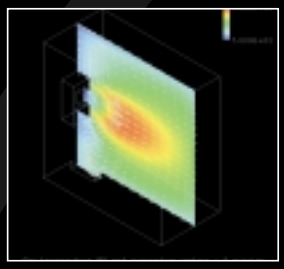
workstations. Moreover, the staff involved expect these projects to lead to continued industrial funding and aim to achieve this by supporting projects that are both relevant to industry and state-of-the-art. Those working in the centre intend that it becomes a major player in the academic world of engineering computation.
The CEDC is equipped with a suite of dedicated Silicon Graphics workstations, on a one per person basis, together with a high-powered graphics machine

for pre- and post-processing of computational studies.
It also houses a six noded Silicon Graphics Power Challenge machine while its largest computations are carried out on the University's IBM SP2 23 noded parallel processor.
There are three main group activities within the CEDC: Evolutionary optimisation, Fluids Structures and a number of other individual areas of research.

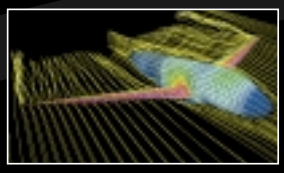
Projects

The following projects are currently supported in the CEDC :-

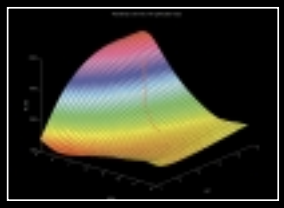
- Development and application of a 3D incompressible Navier-Stokes solver
  Modelling of damage tolerance in advanced heterogeneous materials



- Multi-Level Evolutionary Optimisation Applied to the Conceptual Design of Commercial Aircraft Wings
  Engineering Soils and particulates
- Progressive failure analysis of laminated structures using parallel FE methods
- Control systems design on bounded parameter models



- Computer aided design of semiconductor integrated circuits
- Application of a cell viscous boundary element approach to the numerical simulation of manoeuvering bodies
- Numerical models of head scattered acoustic fields
- Optimal design of structures for passive noise control
- Modelling of the interaction between an electric arc and contact erosion
- Robust design of active control systems

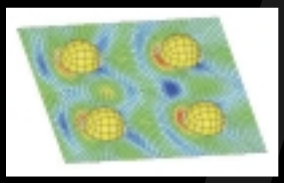


- Efficient modelling and computation of AC fields and losses in high temperature superconductors
- Stochastic optimisation techniques
- Biomechanical computational modelling of a knee prosthesis using virtual prototyping software

We are always interested in collaboration with other workers in this field and have spaces for both post-graduate and post-doctoral workers, given suitable funding (we sometimes have funds to support people - please ask).

Recent Work

- Parallelisation of the discrete transfer radiation model
- Genetic algorithm design of strain gauge load cells
- GA optimisation of approximate or noisy function representations



- Vortex shedding from arbitrary arrangements of cylinders - An application of the boundary element method to the Navier-Stokes equations
- Mixed Mode Simulation of Electronic Circuits Containing Silicon and Silicon-Germanium Semiconductor Devices
- Models of Head Scattered Acoustic Fields for Virtual Acoustic Reality.

This article may be found at http://www.soton.ac.uk/~cedc

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