Combined engineering computation

This research theme has been established to bring together and create a common focus for those members of staff of Civil Engineering with an expertise or interest in computational work. The theme is broad, embracing all major aspects of the computational interests of the staff, whether these interests lie within our main area of Civil Engineering or in engineering more generally (with aspects of, for instance, aeronautical, mechanical, marine, chemical and materials engineering) or in topics such as artificial intelligence, neural networks, knowledge-based systems, etc.

The primary aim of some members of staff is the development of advanced computer software for the investigation and solution of particular practical engineering problems. However, other members of staff may be involved only in the use of software (rather than its development) as part of a research study, parametric study, benchmarking exercise, etc.

Overall, the aim of the theme is to form a group of people who have the collective expertise to produce the means of obtaining numerical solutions to a range of engineering problems, either as an end in itself or as part of a more general investigation when working with other groupings within the School, those from other Schools within the University or external collaborators.

Examples of current and recent research in this theme includes work in the areas of:

Finite Element Modelling (/research/activity/civil-engineering/short-term/computation/finite-mod/index.aspx)

Wave-induced liquefaction of the seabed, seismic response of reinforced concrete structures, bamboo fibre-reinforced concrete, two-phase flow in oil reservoirs; non-linear constitutive models of soils for gas pipelines or piles and concrete materials for deterioration modelling.

Discrete Element Modelling (/research/activity/civil-engineering/short-term/computation/discrete-mod/index.aspx)

Granular particle assemblies, shear plane development in shear box tests, silos; railway ballast under static and dynamic loading.

Information Technologies (/research/activity/civil-engineering/short-term/computation/it/index.aspx)

Virtual reality for structural design; grid computing for large computational systems; knowledge-based decision support system for railway maintenance; computational hardware - coding of simplified DEM code onto a computer chip using field programmable gate arrays or active memory.

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