C 137

Seeing is believing' - Understanding structural behaviour via models

Structural engineers may be capable of using quantitative techniques to analyze a structure, but do they possess a qualitative understanding of structural behaviour. One who understands how a structure behaves should be able to differentiate between a structure and a mechanism, identify load paths and structural actions by which the load is transmitted, predict the deflected shape of the structure and the variation of shear forces and bending moments in the structure. It is difficult to teach these concepts in a formal, conventional classroom atmosphere.

The writer discusses a project that was undertaken to develop a feel or awareness of how structures behave where a series of inexpensive models demonstrating various aspects of structural behaviour were constructed. The aspects included the behaviour of tension and compression elements in trusses and the provision of lateral stability by the method of bracing; the effect of support conditions and the stiffness of the material of the slab on the load carrying capacity of slabs. The behaviour of single span and continuous beams, buckling of columns under axial load and funicular shapes were other structural aspects demonstrated.

The effect of models on understanding structural behaviour was studied with the co-operation of undergraduate student volunteers who participated in a questionnaire survey. The results showed that the students do have a basic understanding of some of the simpler concepts and that the models made a positive contribution to their understanding of structural behaviour albeit to varying degrees.