

Stability Behaviour of Thin-Walled Structures

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This special issue of the journal “Computational mechanics” contains extended and revised versions of the majority of papers presented at the Minisymposium “Stability Behaviour of Thin-Walled Structures” within the Sixth World Congress of Computational Mechanics which was held in Beijing from September 5 – 10, 2004.

Numerical simulations of the load carrying behaviour of thin-walled structures, especially of thin shells, represent a great challenge to researchers in computational mechanics. The rapid advances in computer technology and program development have removed many of the traditional methodological and analytical limitations and have thus opened up new possibilities for fundamental as well as practical advances in the field of thin-walled structures. The stability limits can now also be determined by path-following procedures, and the usual static approach supplemented by dynamic analyses of the stability behaviour. It also becomes possible to investigate the behaviour of materials which exhibit instability modes in the micro- and meso- scale. Nevertheless, nonlinear computer programs cannot be employed efficiently unless the user fully understands the variety of

phenomena to which nonlinear influences may give rise, e.g. in global and local buckling.

Despite the long time of theoretical, experimental, and numerical investigations in this field, it must be stated that there is still no unified consensus on how the stability limit of imperfect-sensitive structures should be evaluated. Although many facets of the problem have been addressed in the past several open questions remain. In this respect it is remarkable that the design of these shells in most cases is still based on empirical reduction factors derived from lower-bound curves to experimental data. Although remarkable progress in understanding the physical backgrounds of this phenomenon has been achieved, the accurate prediction of the load-carrying capacity of imperfection-sensitive shells still remains an object of necessary research activity.

This special issue shall give some insight into recent results in this field and will be of interest not only to the community of researchers but also to the practitioners in industry.

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