

## **CHAPTER 9**

### **General considerations on automatic structure calculation**

#### **9.1 Introduction**

In the previous Chapters we have seen different aspects related to automatic structure calculation; although some of them have been just mentioned (for example the instability calculation, the structure natural frequency determination, the contact between bodies, the material plasticization phenomena, the geometrical non linear forms), we should at this point be able to realize a valid structural design, at least from what is requested in the 90% of the situations. In fact this is more or less the percentage of linear elastic calculations required today in industrial practice, even if the tendency is to go further.

Nevertheless it is necessary not to exceed in the automatic calculations. Often the structural engineer has to “defend” his job against people that do not have the necessary knowledge to understand the advantages and the limitations related to finite element modelling; on one side there is someone who thinks that “everything” can be modelled and on the other hand there is someone else who thinks that the sophistication of FEM calculation is just a waste of time. Probably, like many other things, wisdom stays in the middle of the two extremes; we have seen that in many situations a finite element model is able to catch important phenomena where classical methods fail. But this does not mean that in some cases a hand calculation, possibly also using manuals and formulas books, could not give quick and at the same time reliable answers. In the next paragraphs we will try to give some indications on when it is worth using automatic calculations and when, on the contrary, it is preferable to use classical methods.

#### **9.2 When it is convenient to use classical methods**

Often it is the knowledge of some structural design manuals contents that suggests if the piece under examination has to be analysed using a classical calculation, in the sense that, by knowing all the methods followed by various Authors and/or Researchers, it is possible to establish the level of reliability of the results that could be obtained. Therefore having at our disposal these manuals and consulting them it is often a good practice to be pursued frequently. It must not be forgotten that, in any case, a