

Introduction to Experimental Techniques

In this and the following sections we detail some of the more important, commonly used experimental analysis techniques, some that are deployed during the experiments and some that are primarily used during the analysis of the results. However, it should be emphasized that the more analysis of the results that can be performed during the conduct of the experiments the better. In that way operational problems (for example, instruments that are not working properly) can be identified before too much time and effort is wasted.

Besides keeping a well-documented laboratory notebook and recording all observations in it (including those that may not seem relevant at the time), one of the most valuable practices is to make plots of the results as they develop, even if these are rough, preliminary graphs. Either during the experiments or shortly thereafter those results should be converted to non-dimensional form and non-dimensional plots prepared alongside the dimensional graphs. Some of the most desirable and instructive non-dimensional quantities should have been decided during the preparations for the experiments, and, at that same time, the most instructive non-dimensional plots should have been determined. Of course, there are occasions when more appropriate non-dimensional quantities and graphs do not become apparent until the results start emerging; then a rapid transition to those revised quantities and graphs is clearly advisable.

Almost all experiments begin with a phase during which the instrumentation is checked and adjusted and it is important to resist the temptation to rush through that phase. Adjustable features such the setting on filters, the duration of averaging and the data sampling rates need to be checked as well as the time required for the various measurement readings to reach a steady state.