For decades modal analysis has been used in power system analysis to assess small signal stability. Traditionally, this has been done using model-based eigenvalue analysis. More recently measurement-based techniques have emerged and are now widely used. This tutorial provides an overview of this topic, with a particular focus on showing how these techniques can be easily applied to large-scale system measurements and how results can be best visualized. While a number of approaches will be considered, the main focus will be on an algorithm known as the Iterative Matrix Pencil (IMP). The tutorial will show how the IMP can be applied to systems with a large number of signals, and how the quality of the results can be verified. An application of the technique for power system stabilizer design will also be considered. The approach will be demonstrated on several electric grid models with sizes to 80,000 buses.