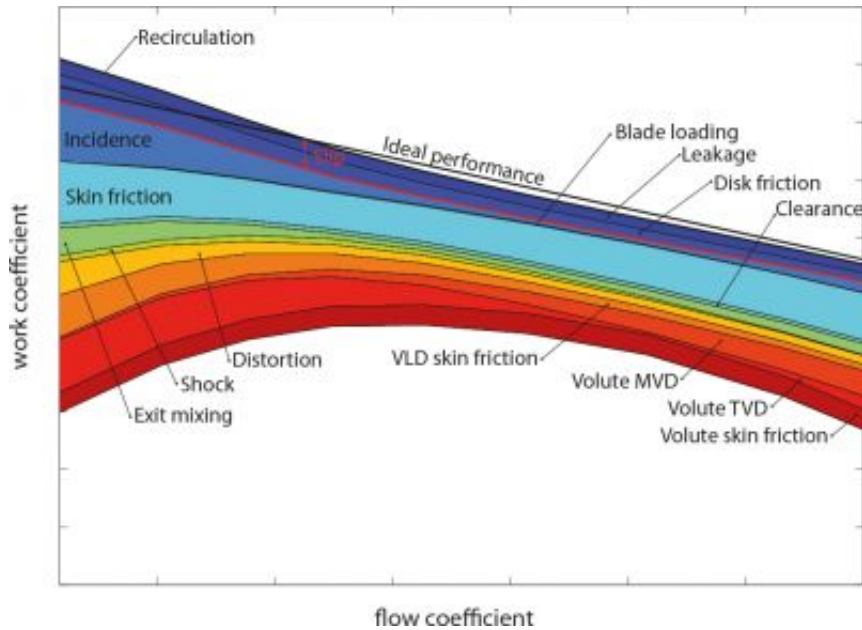


### Analytical turbomachinery modeling



In cooperation with the Institute of Gas Turbines & Aerospace Propulsion at the Technical University of Darmstadt empirical models for the prediction of turbomachinery characteristics were developed. The prediction of component characteristics is crucial during the early stages of the development cycle when developing a new machine. The dimension and prediction of component interaction within turbomachinery (e.g. compressor turbine interaction in the gas turbine) and interaction with other machines and machine elements are also a core part of the design process (e.g. turbocharged engine interaction in automobiles).

While complex numerical simulations and prototype tests are often not possible during the early stages of development, empirical models can be applied to receive information about the turbo machine behavior. Machine characteristics can be estimated using these methods in only a few minutes. The methods used are a mixture of analytical equations with empirically determined loss coefficient.

As well as the rapid prediction of machine characteristics, this tool can also be used to identify loss mechanisms. In a numerical simulation, it is often very difficult to separately identify individual loss mechanisms and their impacts. The empirical model determines all losses individually and is therefore the perfect tool to identify loss-driving mechanisms.

