Dynamics and control of hydrofoil wakes MORTEN KJELDSEN, Norwegian U. of Sci. and Tech., MARTIN WOSNIK, U. of NH, ROGER ARNDT, U. of MN — The problem of rotor-stator interaction (RSI) is an issue within the field of turbomachinery. The flow field entering the rotor cascade will depend on the stator blade to blade velocity distributions, and the viscous wake trailing cascade blades. This flow field is also dependent on the mode of operation, e.g by changing the angle of each blade in hydroturbines. Manipulating the stator viscous wakes is one method to minimize the problems associated RSI; i.e. noise and vibration. In order to explore this concept, a comprehensive experimental program was carried out in a high-speed water tunnel utilizing a series of NACA 0015 hydrofoils. Baseline wake data were collected with a hydraulically smooth foil and compared with two foils modified with two sizes of vortex generators (VG) positioned close to the leading edge of the foil. Not only was the effect of the modifications on wake spreading investigated but also the effect on wake dynamics such as vortex shedding was studied. A high frame-rate PIV system was used at recording rates of 1 and 10 kHz to map the near wake region, extending roughly 1 chord-length downstream the trailing edge, over a range of angles of attack and velocities. The results show that wake dynamics and wake characteristics, i.e. velocity deficit and width, scale with average drag. It was demonstrated that the use of VGs can improve both the dynamics and spreading characteristics of the wake.