Adaptive Feed Forward for Digital RF Control System for the TESLA Test Facility, M. LIEPE, <u>S.N. SIMROCK</u>, DESY - The rf control system of the TESLA Test Facility regulates the vector sum of multiple superconducting cavities which are operated in pulsed mode at accelerating gradients exceeding 15 MV/m. In addition to the feedback control loop which suppresses stochastic errors, feedforward is applied to reduce repetitive perturbations induced by beam loading and dynamic lorentz force detuning. In the case of TESLA repetitive errors are dominating. The feedforward algorithm first identifies the time varying state space model of the closed loop system by measurement of a step response. Next the pulse to pulse average of the measured perturbations is applied to the inverse state space model to obtain the correct feedforward table. The feedforward tables can be updated continuously to follow slow changes in the perturbation parameters. On-line system identification is transparent to routine beam operation due to the small step size used.