Simulation of Fast Feedback for Orbit Correction, I. REYZL, TU Berlin - This paper describes the design of a bunch to bunch feedback system for the linear collider TESLA. Based on linear state-space models it uses a predictor-corrector formalism of the optimal control theory. In order to control the orbit of the beam the settings of the correctors are determined (via Linear Quadratic Gaussian Control) by an estimation of the state vector. On the basis of measurements the state is estimated by the Kalman filter which minimizes the variance of the estimation error. The feedback loop algorithm is defined by matrix equations. Its advantage are the applied matrices which can be derived in advance of the measurements. First results of numerical simulations are presented.