Theory of a Transverse Feedback System with a Non-linear Transfer Function, V.M. ZHABITSKY, JINR - The theory of transverse feedback system with a non-linear transfer function is described. For this feedback loop the dependence between the kick and the beam deviation at the pick-up location is a non-linear function. The beam dynamic equation of the transverse coherent motion for deviation from the closed orbit has been obtained. This non-linear equation has been solved using approximation procedure. Damping time and asymptotic behaviour of the beam oscillation amplitude are analysed for different parameters of the non-linear transfer function.