ABSTRACT

In this thesis we concentrate on open-loop control scheme to investigate the behavior of dynamical system described by non-linear differential equation. We will discuss different types of the system: classical and quantum, and apply control methods to change the dynamical behavior of the system in coordinate or momentum space.

In Chapter 1 we give some basic definitions and describe Kapitza procedure of averaging for open-loop control, then we give examples of stabilization by this method.

In Chapter 2 we propose the generalization of Kapitza procedure of averaging to stabilize the oscillator driven by periodical external field. We do this with the help of periodical external rectangular pulses, by applying Modified Kapitza procedure of averaging, then we stabilize the oscillator by minimizing the effective potential energy function. We demonstrate the effect of stabilization with relatively low frequency for spatial shape of the external periodical field to compare with sin- or cos-periodical force.

In Chapter 3 an effective quantum particle beam-splitter in the momentum space is realized in the frame of open-loop control scheme; We demonstrate for small interaction time that the splitting effect $\pm 40\hbar k$ with summarized relative intensity in both main components is about 50 per cent from initial intensity of the atomic beam.