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taking into account the dynamic forces like centripetal and coriolis forces which vary in proportion to the square of the speed so the linear control laws put a serious constraint on speed of motion to achieve a specified accuracy figure 1-5 control system with friction in example 1-6 figure 1-5 shows a block diagram of a mechanical system with friction under pid control the friction block is given by  $f = f_0 \text{sign } v$  let  $x(0) = x_0$  and rewrite the system equations into feedback connection form i.e. a linear system in feedback with a nonlinear system 5 hassan k khalil pearson education may 28 2015 technology engineering 400 pages for a first course on nonlinear control that can be taught in one semester this book emerges from the el2620 nonlinear control exercises and homework henning schmidt karl henrik johansson krister jacobsson bo wahlberg per hägg elling w jacobson mpc's are nonlinear control methods which are generally suitable to linear plants with limited control 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