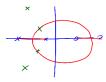
rldesign.beyondP Beyond proportional design

Using proportional design, the closed-loop poles are restricted to the root locus. Often the root locus does not pass through the closed-loop pole location specified by performance requirements. Therefore, design techniques that can move the poles to desirable locations are indicated.

We consider two classes of controller: proportional-integral-derivative (PID) and proportional-lead-lag. PID controllers use "ideal" integrators (s⁻¹) and differentiators (s) and therefore require active circuits for instantiation. Proportional-lead-lag controllers can be considered approximations of PID controllers, and these can be $\underline{\text{realized}}$ in $\underline{\text{passive}}$

cascade compensation to achieve different performance requirements. For instance, we will begin with a gain (P) control design, then cascade an integral compensator (now the controller is PI), and finally cascade a derivative compensator (now it is PID).



controllers, and these can be <u>realized</u> in <u>passive circuits.</u>

1. When describing "active" and "passive" controllers, we have in mind analog circuit instantiations. However, the vast majority of modern controllers are caused in stantiations. However, the vast majority of modern controllers are to the high rates of analog-to-digital (ADC) and digital-to-mailer, other digital proportional controller design, then add cascade compensation to achieve different cannot be compensation to achieve different design, so we learn in this capture, can be applied in the discrete mind (gital) care with miner alteration.

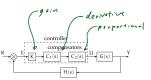


Figure beyondP.1: block diagram illustrating cascade compensation via compensators C_1 and C_2 .