عنوان مقاله:

KP- stable Regions in the Space of Time Delay and PI Controller Coefficients

محل انتشار:

بیست و دومین کنفرانس سالانه بین‌المللی مهندسی مکانیک (سال: 1393)

تعداد صفحات اصل مقاله: 6

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خلاصه مقاله:

The destabilizing effects of time delays on linear systems make the control design for such systems a challenging task. This study aims to develop a new graphical method to define the stable regions in the space of uncertain delay and controller coefficients.The Nyquist features of the open loop transfer function are used to design the proportional-integral controllers which guaranty the closed-loop stability for the first order and second order plants with uncertain time delay. The main intention is to determine the regions in the space of uncertain delay and controller coefficients for which stable gain intervals exist. This is achieved by drawing the boundaries in the uncertain parameters space where the Nyquist plot gets tangent to the real axis. As a result, there is no need to sweep the gain or time delay parameter to sketch the stability boundaries. Rekasius substitution is employed to convert the characteristic quasi-polynomial to a polynomial. The results can be used to design proportional–integral controllers for FOPDT and SOPDT systems with uncertain time delay.

کلمات کلیدی:

Nyquist plot, PI controller, Rekasius substitution, uncertain delay, Stability boundaries

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