INTISARI

KENDALI PENELUSURAN LINTASAN PENERBANGAN PESAWAT TANPA AWAK SAYAP TETAP DENGAN PENDEKATAN *CROSS-TRACK ERROR*

Oleh

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Pemanfaatan teknologi pesawat tanpa awak sayap tetap atau *fixed wing* telah berkembang tidak lagi terbatas pada bidang militer saja, namun dibidang pemantauan, pemetaan, dan juga foto udara. Untuk dapat melakukan misi tersebut wahana harus dapat menelusuri garis *waypoint.*

Sistem kendali penelusuran garis *waypoint* yang dibuat pada penelitian ini menggunakan metode *Linear Quadratic Regulator* (LQR) untuk memperoleh *gain* **K** dari sistem kendali saat mempertahankan kestabilan sikap lateral dan longitudinal wahana selama misi penelusuran titik koordinat waypoint. Pada kendali navigasi digunakan metode L1 *controller* yang menghasilkan nilai percepatan lateral dan dikonversikan menjadi nilai sudut untuk navigasi *roll* pada wahana saat menelusuri garis *waypoint.*

Berdasarkan penelitian yang telah dilakukan, didapatkan hasil berupa respon sistem yang telah sesuai dengan spesifikasi kendali yang ditetapkan serta dengan peralatan yang dipakai pada penelitan ini. Kecenderungan *steady-state* sistem yang didapat untuk anti-*roll* sebesar 0,11º, anti-*pitch* 0,12º dan anti-*yaw* 2,65º. *Rise time* yang dihasilkan anti-roll 0,5 detik, anti-*pitch* 0,6 detik dan anti-*yaw* 1,2 detik. Hasil tersebut menunjukkan sistem kendali pada penelitian ini telah mampu mempertahankan kestabilan sikap wahana selama menyusuri garis *waypoint*. Serta dengan nilai L1 *period* sebesar 15 detik dan L1 *damping* sebesar 0,707, wahana mampu mempertahankan posisinya saat menelusuri garis pada misi *auto.*

Kata kunci: LQR, *waypoint*, sudut *bearing*, L1 *controller*

ABSTRACT

WAYPOINT TRACKING WITH CROSS-TRACK ERROR APPROACH CONTROL FOR A FIXED WING UNMANNED AERIAL VEHICLE (*UAV*)

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Utilization of fixed wing unmanned aircraft technology or fixed wing has grown no longer limited to the military field, but in the field of monitoring, mapping, and also aerial photography. To be able to carry out these mission the vehicle must be able to trace the waypoint lines.

The waypoint lines tracking control system created in this research uses the Linear Quadratic Regulator (LQR) method to obtain the gain K from the control system while maintaining the stability of the lateral and longitudinal attitude of the vehicle during the waypoint coordinate tracking mission. In the navigation control the L1 controller method is used which produces a lateral acceleration value to be converted into an angle value for navigation roll on the vehicle when tracing the waypoint lines.

Based on research that has been done, the results obtained in the form of a system response that is in accordance with the specified control specifications and with the equipment that used in this research. The steady-state tendency result for anti-roll systems is 0.11º, anti-pitch 0.12º and anti-yaw 2.65º. The result of rise time for anti-roll 0.5 seconds, anti-pitch 0.6 seconds and anti-yaw 1.2 seconds. These results indicate the control system in this study has been able to maintain the stability of the vehicle's attitude while walking along the waypoint line. As well as the value of L1 period is 15 seconds and L1 damping is 0.707, the vehicle has been able to maintain its position when tracing a line on an auto mode mission.

Key word : LQR, *waypoint, bearing angle*, L1 *controller*