Perancangan pengendali model predictive control tanpa constrain pada sistem proton exchange membrane fuel cell menggunakan C-MEX S-Function = Design of model predictive control without constraint for proton exchange membrane fuel cell using C-MEX S-Function

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Abstrak

Pada skripsi ini akan dirancang pengendali Model Predictive Control tanpa constraint pada sistem Proton Exchange Membrane Fuel Cell. Sebelumnya, dilakukan identifikasi sistem PEMFC dengan metode Least Square berdasarkan data masukan dan keluaran sistem nonlinier untuk mendapatkan model linier. Masukan sistem adalah flow H2, flow O2, dan arus. Kemudian dilakukan uji keabsahan model hasil identifikasi dengan membandingkan respon tegangan keluaran model nonlinier dengan model hasil indentifikasi. Selanjutnya, pengendali MPC tanpa constraint dirancang pada model identifikasi PEMFC dengan nilai parameter matriks faktor bobot Q dan R yang bervariasi. Dari hasil simulasi diperoleh respon pengendalian yang cukup baik meskipun hanya terbatas pada nilai matriks Q= 10 IHp dan R=5000 I6. Hal ini dapat dilihat dari respon yang dapat mengikuti sinyal acuan.
<hr>In this final thesis, a Model Predictive Control without constraint was designed in Proton Exchange Membrane Fuel Cell. Before designing, PEMFC system identification had been done using Least Square method based on input and output data of the nonlinear system to obtain linear model. System inputs are H2 flow, O2 flow, and current. Then, validation test was done by comparing voltage response of nonlinear and identification model. After that, a MPC controller without constraint was designed in identification model. The weighting matrices Q and R were varied to observe their effect to control result. From the simulation result, a quite good control result was obtained even though it's only limited to Q= 10 IHp and R=5000 I6. The quite good result can be observed from the tracking of setpoint.