

SUMMARY

ANALISA EKSPERIMENTAL STABILITAS SISTEM KONTROL HIDROLIK MESIN MULTIBLOCK SB 306

EXPERIMENTAL STABILITY ANALYSIS OF MULTIBLOCK MACHINE SB 306 HYDRAULIC CONTROL
SYSTEM

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Subject : Hydraulic control

Subject Alt : Hydraulic control

Keyword : Multiblock machine, absolute stability, relative stability, hydraulic, system response

Description :

Penelitian ini bertujuan untuk menguji nilai kestabilan sistem hidrolik dari mesin Multiblok SB 306, karena didalam memproduksi mesin multiblock SB 306, PT. Suryabaja Sentral Anugerah tidak melibatkan suatu analisa kestabilan sistem hidroliknya.

Penelitian dilakukan pada saat mesin Multiblock SB 306 beroperasi, yaitu dengan mengukur tekanan, debit aliran serta dimensi aktuator hidrolik. Kemudian, data hasil pengukuran digunakan sebagai parameter dari model matematik sistem. Dari model matematik tersebut, diperoleh fungsi transfer dan respon sistem loop tertutup. Respon sistem aktual tersebut dibandingkan dengan hasil simulasi, yang selanjutnya dianalisa dalam domain waktu dan frekuensi.

Simulasi dilakukan, dengan memberikan dua macam input dengan karakteristik sinusoida dan karakteristik step. Hasil pada curve fitting menunjukkan bahwa simulasi (respon tekanan dan debit aliran) yang menggunakan input dengan karakteristik step memberikan tingkat keakuratan yang lebih tinggi saat hasil simulasi dibandingkan dengan hasil pengukuran aktual di lapangan. Dari analisa kestabilan, didapatkan bahwa dalam kondisi aktual, sistem berada dalam kondisi stabil absolut dengan gain margin bervariasi untuk tiap rangkaian silinder hidrolik. Stabilitas dalam domain frekuensi untuk tiap rangkaian silinder hidrolik ditunjukkan oleh nyquist diagram yang tidak encircle (-1,0) yang menunjukkan kondisi stabil. Sedangkan Bode Plot dari tiap rangkaian silinder digunakan untuk mengamati fenomena frekuensi puncak sistem yang menunjukkan besarnya frekuensi natural sistem tidak teredam.

Description Alt:

This Research intends to evaluate hydraulic system stability value from Multiblock Machine SB 306, because in producing Multiblock Machine SB 306, PT. Surya Baja Sentral Anugerah did not entangle hydraulic system stability analysis

Research is conducted by measuring pressure and flow rate when the Machine in operating condition as well as hydraulic actuators' dimension. Afterward, measurement data are used as system's mathematical model parameters. From the mathematical model, transfer function and closed loop system response are obtained. The actual System's Response then compared to the simulation's result, and being analyzed in frequency and time domain.

Simulation is done, by giving two kinds of input characteristics which are sinusoidal and step. Curve fitting' results indicate that simulation (pressure and flow rate response) using input with step characteristic offer higher level of accuracy when compared to the result from actual measurement. From stability analysis, it is obtained that in actual condition; the system stays in an absolute stable condition where its gain margin varies amid every hydraulic cylinder circuits. Its frequency domain's stability is shown by Nyquist Diagram which is not encircle - 1,0. This condition illustrates a stable condition. Bode Plot of each hydraulic cylinder circuits used to identify peak frequency phenomenon, which thought to be the magnitude of system's undamped natural frequency

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Thank You,

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