

Pengendalian pressure process rig menggunakan backpropagasi dengan aritmatika fuzzy = Controlling pressure process rig using neural network backpropagation with fuzzy arithmetic

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Abstrak

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Pengendalian tekanan udara sulit karena sistem tersebut umumnya memiliki konstanta waktu dan time delay yang besar yang mempersulit pengendalian. Tesis ini membahas penelitian menggunakan backpropagasi dengan aritmatika fuzzy untuk mengendalikan sistem Process Pressure Rig (PPR). Pendekatan ini menggunakan gabungan dari kemampuan belajar dari backpropagasi dan kemampuan menghadapi nilai yang awang-awang (fuzzy) dari instrumentasi untuk mengendalikan suatu proses. Data crisp dari sensor difuzzifikasikan menjadi bilangan fuzzy dan dihitung dalam jaringan menggunakan aritmatika fuzzy, dan bobotnya disesuaikan untuk memperkecil error. Keluarannya didefuzzifikasikan kembali menjadi sinyal kendali. Di tesis ini, sistem PPR adalah sistem SISO dengan karakteristik konstanta waktu dan time delay yang besar dan derau bacaan sensor yang cukup besar. Hasil pengujian kendali dengan metode backpropagasi dengan aritmatika fuzzy ini menunjukkan hasil yang lebih baik daripada kendali dengan backpropagasi dengan bilangan crisp.

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ABSTRACTM

Pressure control are usually difficult because of large time constant and large time delays. This thesis propose a new method of backpropagation with fuzzy arithmetic to control Process Pressure Rig(PPR). This approach combines the ability of neural network to learn pattern and fuzzy logic ability to handle fuzzy values. Crisp input from sensors are fuzzified and normalized to fuzzy data. Backpropagation calculate fuzzy data and adjust connection weight to reduce error. The output are then defuzzified and denormalized back to crisp control signals. In this thesis, PPR is a Single in Single out system with large time constant, large delays, and noisy pressure sensors. Test results shows that backpropagation with fuzzy arithmetic can produce better control with less error compared to control using backpropagation with crisp numbers.

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