Disain dan pemilihan pengendali pada vacuum distillation unit menggunakan unisim = Design and selection of controller of vacuum distillation unit using unisim

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Abstrak

ABSTRAK
Saat ini Indonesia masih mengalami defisit BBM sehingga diperlukan pembangunan kilang minyak yang baru. Pada suatu kilang, terdapat unit operasi sekunder berupa VDU vacuum distillation unit untuk mengolah produk residu atmosferik dari CDU crude distillation unit . Dalam rangka menjaga kestabilan operasi diperlukan sistem pengendalian yang tepat dan optimum. Oleh karena itu, dalam penelitian ini akan dipilih antara pengendali konvensional prorportional-integral, PI dan pengendali lanjut model predictive control, MPC untuk mengendalikan laju alir umpan, suhu umpan, tekanan top-stage, level kondenser, suhu bottom-stage, dan laju alir LVGO light vacuum gas oil , MVGO medium vacuum gas oil , dan HVGO heavy vacuum gas oil . Pengujian kinerja keduanya dilakukan dengan melakukan perubahan set-point dan gangguan sebesar 10 , 25 , dan 50 yang diukur menggunakan nilai ISE integral square error -nya. Hasilnya, untuk pengendalian laju alir umpan, suhu umpan, tekanan top-stage, suhu bottom-stage, dan laju alir LVGO, MVGO, dan HVGO digunakan MPC karena terjadi perbaikan kinerja sebesar 34 , 75 , 97 , 98 , 22 , 68 dan 80 saat pengujian perubahan set-point dibanding dengan pengendali PI, sedangkan untuk pengendalian level kondenser digunakan pengendali PI karena kinerjanya jauh lebih baik dibandingkan dengan MPC. Untuk pengujian gangguan yang sangat besar 50 dari laju alir umpan , persentase kesalahannya pada suhu umpan, tekanan top-stage, level kondenser, suhu bottom-stage, laju alir LVGO, MVGO, dan HVGO masing-masing sebesar 6 , 5,5 , 6 , 5,5 , 0,3 , 0,7 , dan 1,6 .
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ABSTRACT
At this time, Indonesia is still suffering fuel deficit. So that, new oil refinery is needed. In oil refinery, there is secondary process unit, VDU vacuum distillation unit , for processing atmospheric residue from CDU crude distillation unit . In order to maintain the stability of the operation, a proper and optimum control system is required. Therefore, in this study will be selected between conventional controller prorportional integral, PI and advanced controller model predictive control, MPC to control feed flow rate, feed temperature, top stage pressure, condenser level, bottom stage temperature, and the flow rate of LVGO light vacuum gas oil , MVGO medium vacuum gas oil , and HVGO heavy vacuum gas oil . The performance test of MPC and PI which is done by conducting set point and disturbance changes 10 , 25 , and 50 , measured by using ISE integral square error values. As a result, for feed flow control, feed temperature, top stage pressure, bottom stage temperature and flow rate LVGO, MVGO, and HVGO MPC is used due to performance improvements, respectively 34 , 75 , 97 , 98 , 22 , 68 and 80 , in set point changes test compared to PI controllers. While for the level control of condenser, PI control is used because its performance is much better than the MPC. For very large disturbance tests 50 of the feed flow rate , the percentage of error of feed temperature, top stage pressure, condenser level, bottom stage temperature, flow rate LVGO, MVGO and HVGO were 6 5.5 , 6 , 5.5 , 0.3 , 0.7 , and 1.6 respectively.