ANALISIS DAN SIMULASI SYMPATHETIC TRIP PADA GARDU INDUK 150 KV WIROBRAJAN MENGGUNAKAN SOFTWARE ETAP 12.6.0

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Abstrak

Tujuan proyek akhir ini adalah untuk mengetahui dan memahami tentang gangguan *sympathetic trip* dan analisis nilai setting *relay* pengaman arus lebih (*overcurrent*) dan gangguan tanah (*groud fault*) yang ada disistem distribusi tenaga listrik yang mengambil objek penelitian di Gardu Induk 150 KV Wirobrajan yang beralamat di Jl. R. E. Martadinata No. 1, Wirobrajan, Yogyakarta. Serta dapat melakukan pemodelan *single line diagram* dan setting *relay* pengaman pada gardu induk tersebut menggunakan data yang didapat yang selanjutnya dianalisis sehingga dapat dituangkan kedalam bentuk simulasi software ETAP 12.6.0, sehingga bisa disimpulkan bahwa gardu induk tersebut terdapat potensi gangguan *sympathetic trip* atau tidak.

Metode Analisis unjuk gangguan *symphatetic trip* di gardu induk 150 KV Wirobrajan ini dilakukan dengan melakukan, 1) pengajuan ijin observasi ke pihak PLN, 2) observasi dan pengambilan data di gardu induk, 3) pengolahan data dan analisis gangguan hubung singkat, 4) analisis setting *relay* arus lebih (*overcurrent*) dan gangguan tanah (*groud fault*), 5) pemodelan *single line diagram* di ETAP, 6) setting *relay* arus lebih (*overcurrent*) dan gangguan tanah (*groud fault*) di ETAP

Berdasarkan analisis yang telah dilakukan, diperoleh hasil analisis gangguan *symphatetic trip* di gardu induk 150 KV Wirobrajan sebagai berikut. kapasitas trafo sebesar 60 MVA dengan impedansi trafo sebesar 12,5%, impedansi sumber sisi 150KV sebesar 0,0061 Ohm, disisi 20KV sebesar 3,464 Ohm, nilai reaktansi trafo pada urutan positif/negatif 0,833 Ohm, urutan nol 2,5 Ohm, penghantar jenis A3C 240 mm^2 dengan impedansi urutan positif/negatif 0,1344+j 0,3158, urutan nol 0,2824+j 1,6033. analisis setting *relay* arus lebih TMS sebesar 0,20 detik, setting arus primer sebesar 1818,65 A, setting arus sekunder sebesar 0,909, waktu pickup 0,7 detik. analisis *relay* gangguan tanah TMS 0,26 detik, arus primer sebesar 112,16 A, setting arus sekunder 0,056, waktu pickup 0,7 detik. berdasarkan kurva trip dari setting data *relay* arus lebih dan gangguan tanah menunjukan tidak ada indikasi gangguan *sympathetic trip*. berdasarkan simulasi menggunakan ETAP gangguan *sympathetic trip* disebabkan oleh kesalahan setting *relay* arus lebih dan gangguan tanah, pengambilan *pickup time* dan pemilihan *curve*, untuk menghindari gangguan tersebut dianjurkan menggunakan *standard invers*

Kata Kunci : *Sympathetic Trip*, Gardu Induk, ETAP

ANALYSIS AND SIMULATION OF SYMPATHETIC TRIP AT

SUBSTATION 150 KV WIROBRAJAN USING ETAP 12.6.0

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Abstract

The purpose of this final project is to know and understand the disturbance of the sympathetic trip and analysis of the overcurrent and groud fault relay settings in the electric power distribution system that take the object of research at the 150 KV Wirobrajan Substation which is located at Jl . R. E. Martadinata No. 1, Wirobrajan, Yogyakarta. And can do a single line diagram modeling and setting of relays at the substation using the data obtained which is then analyzed so that it can be poured into the form of ETAP 12.6.0 software simulation, so it can be concluded that the substation has potential disruption of the sympathetic trip or not.

Method Analysis of the symphatetic trip disturbance at the 150 KV Wirobrajan substation is carried out by doing, 1) submitting permission for observation to the PLN, 2) observing and collecting data at the substation, 3) processing data and analyzing short circuit disturbances, 4) analysis of settings overcurrent and groud fault relays, 5) single line diagram modeling in ETAP, 6) setting overcurrent and groud fault relays at ETAP

Based on the analysis that has been done, the results of the analysis of symphatetic trip disturbances at the 150 KV Wirobrajan substation are as follows. 60 MVA transformer capacity with transformer impedance of 12.5%, 150KV side source impedance of 0.0061 Ohm, 20KV at 3.464 Ohm, transformer reactance value in positive / negative order 0.833 Ohm, zero sequence 2.5 Ohm, type conductor A3C 240 mm2 with positive / negative sequence impedance 0.1344 + j 0.3158, zero sequence 0.2824 + j 1.6033. analysis of TMS overcurrent relay settings of 0.20 seconds, primary current setting of 1818.65 A, secondary current setting of 0.909, 0.7 seconds pickup time. TMS 0.26 second fault analysis relay, primary current 112.16 A, secondary current setting 0.056, 0.7 seconds pickup time. based on the trip curve of the relay data settings overcurrent and ground disturbances show no indication of a disturbance of the sympathetic trip. based on simulations using ETAP interference with sympathetic trips caused by fault settings for overcurrent relays and ground faults, taking pickup time and curve selection, to avoid such interference it is recommended to use standard inverses

Keyword : Sympathetic Trip, ETAP, Power Subtation