

Challenges in the Presence of Renewables

Study Committee B5, PS 1

Q1.02: Are risks of distance protection maloperation or failure to trip limited to transmission lines directly connected to the wind power plant or do you see broader implications for protection further away from the wind power plant point of connection to the transmission grid?

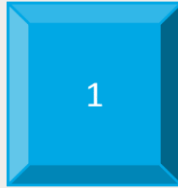
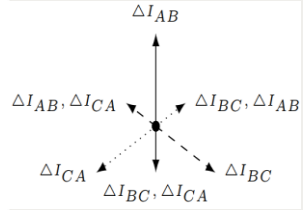
Simon Richards (UK), Venkatesh Chakrapani (UK)
Patricia Horton (UK)



DISTANCE IMPACT

ROOT CAUSE

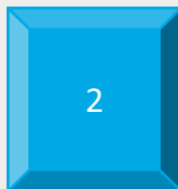
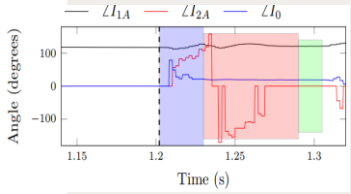
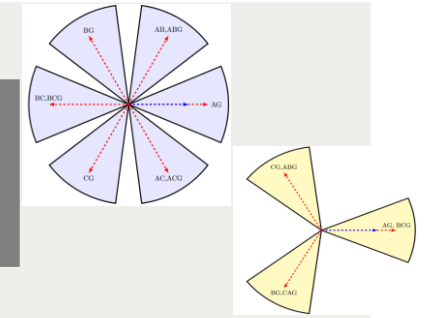
SOLUTION



DEPENDABLE AND SECURE DISTANCE

DEPENDABLE AND SECURE PHASE SELECTION

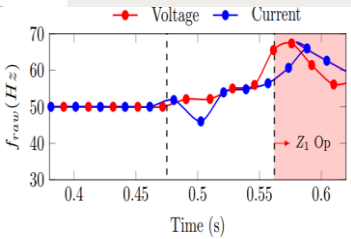
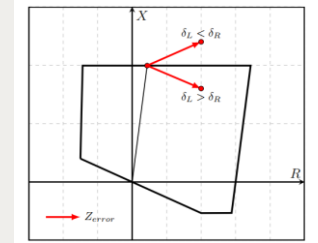
NEW PHASE SELECTOR



QUAD TOP REACTANCE LINE

UNRELIABLE SEQUENCE CURRENTS

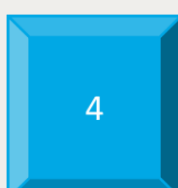
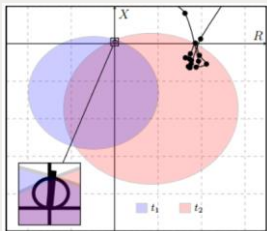
INBUILT INTELLIGENCE TO SELECT THE BEST POLARISATION



OVERREACHING

FREQUENCY EXCURSION DUE TO CROWBAR OPERATION

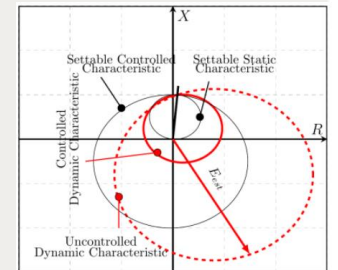
ADAPTIVE TIME DELAY



MHO SWINGS

VARYING SOURCE IMPEDANCE

CONTROLLED DYNAMIC MHO



Group Discussion Meeting