Georgia Institute of Technology
School of Electrical and Computer Engineering

EE4321 **Power System Engineering** **Spring 2009**

Homework Assignment #6
Due March 31, 2009

Problem P1: A synchronous three-phase 200 MVA, 60 Hz, 18 kV generator delivers 200 MW to an infinite bus through two-three phase transmission lines, as it is illustrated in Figure P1. At the terminals of the generator the voltage is 1.0 pu and the power factor is 1.0 (unity).

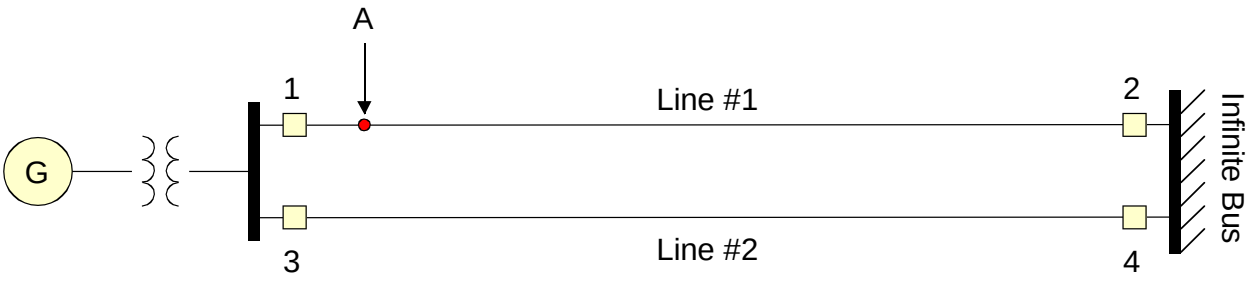

Figure P1

At time t=0 a three phase fault occurs at the location A of the transmission line #1. The total impedance from point A to the transformer high side bus is practically zero. Following the fault the breakers 1 and 2 operate to clear the fault within time tc. In this case the line #1 is permanently disconnected from the system.

Compute the stability region of this system in the (omega,delta) plane. This means compute the separatrix for this system.

Additional data for this system are:

Generator: $z_d^{'} = j0.20\ pu, \quad H = 2.8\ \text{sec}\,onds$

Transformer: $S = 200\ MVA, \quad 18kV\,/\,115kV, \quad z_1 = z_2 = z_0 = j0.08\ pu$

Each Transmission Line: $115\,kV, \quad z_1 = z_2 = j0.12\ pu, \quad z_0 = j0.60 \quad @\,100MVA\ and\ 115\,kV$