2.8 Equal Area Criterion

Consider the swing equation for a machine connected to an infinite bus derived previously in the form

$$\frac{2H}{\omega_R}\frac{d^2\delta}{dt^2} = P_m - P_e = P_a \text{ pu} \tag{2.43}$$

where P_a is the accelerating power. From (2.43)

$$\frac{d^2\delta}{dt^2} = \frac{\omega_R}{2H} P_a \tag{2.44}$$

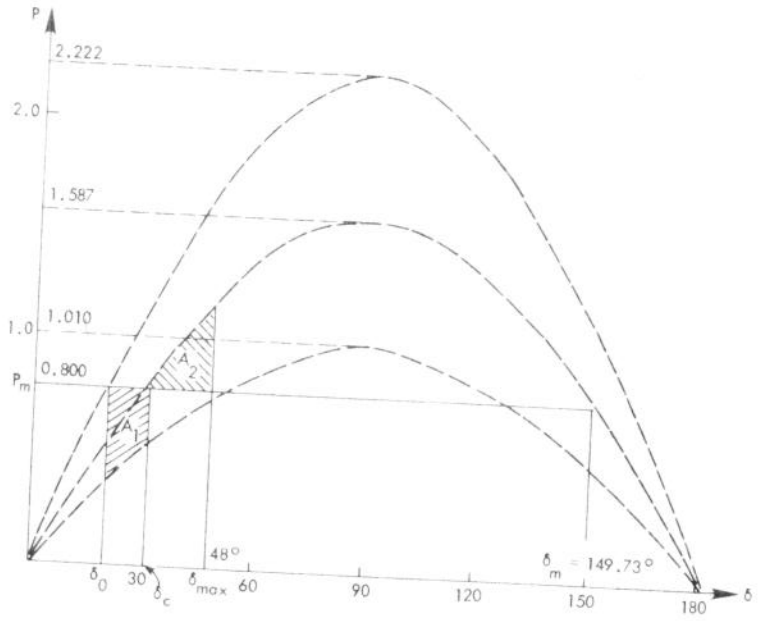

Fig. 2.15 Application of the equal area criterion to a stable system.

postfault networks are the same as before. For this system

$$r_1 = 0 \qquad \delta_0 = 21.09°$$
$$r_2 = 1.587/2.222 = 0.714 \qquad \delta_m = 149.73°$$

Calculation of the critical clearing angle, using (2.51), gives

$$\delta_c = \cos^{-1} 0.26848 = 74.43°$$

This situation is illustrated in Figure 2.16.

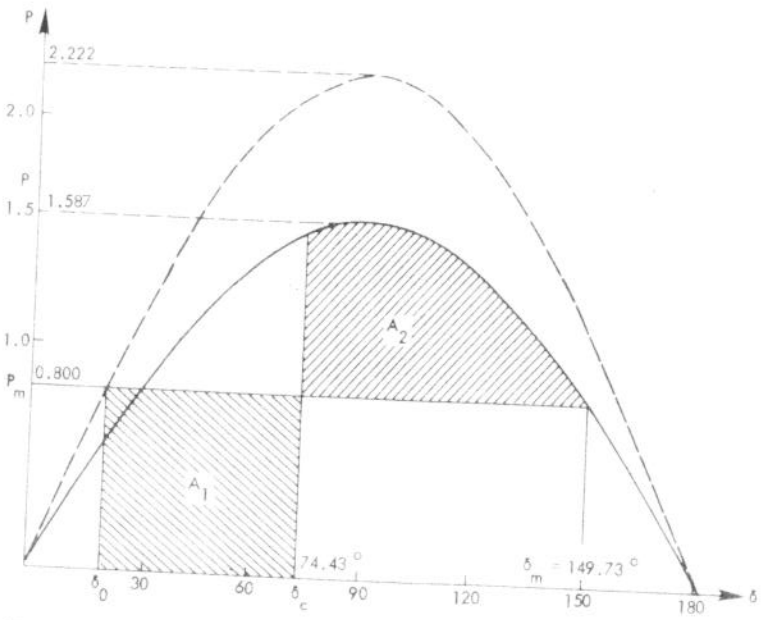

Fig. 2.16 Application of the equal area criterion to a critically cleared system.