

FIGURES FOR CHAPTER 3

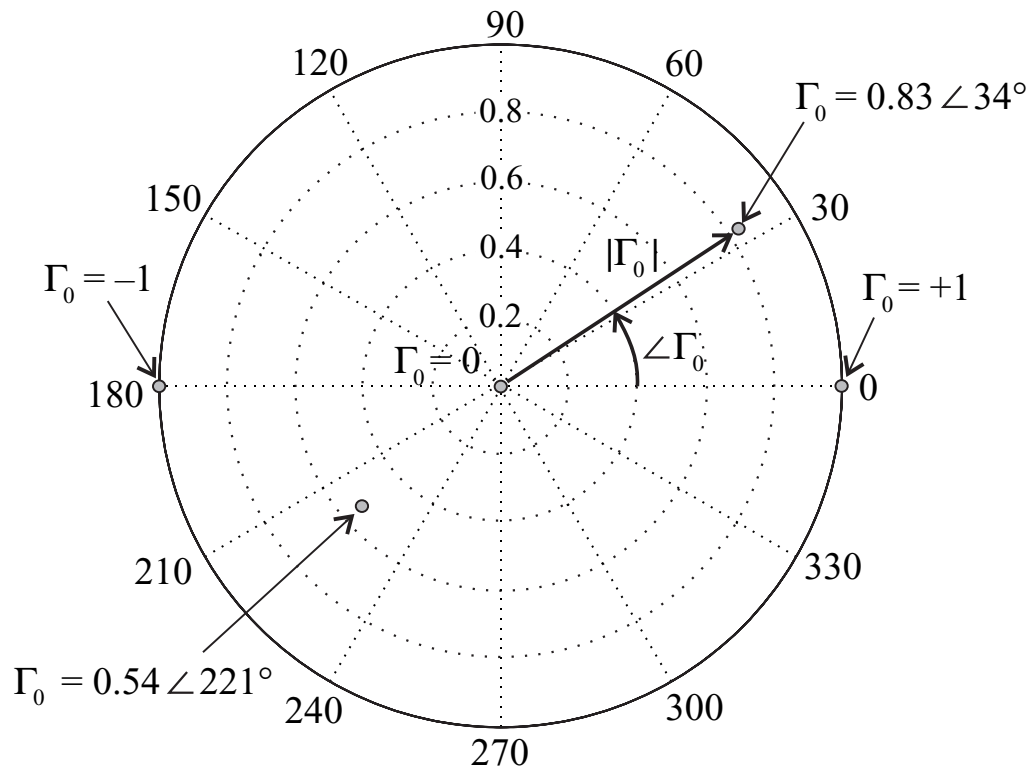


Figure 3-1 Complex Γ -plane and various locations of Γ_0 .

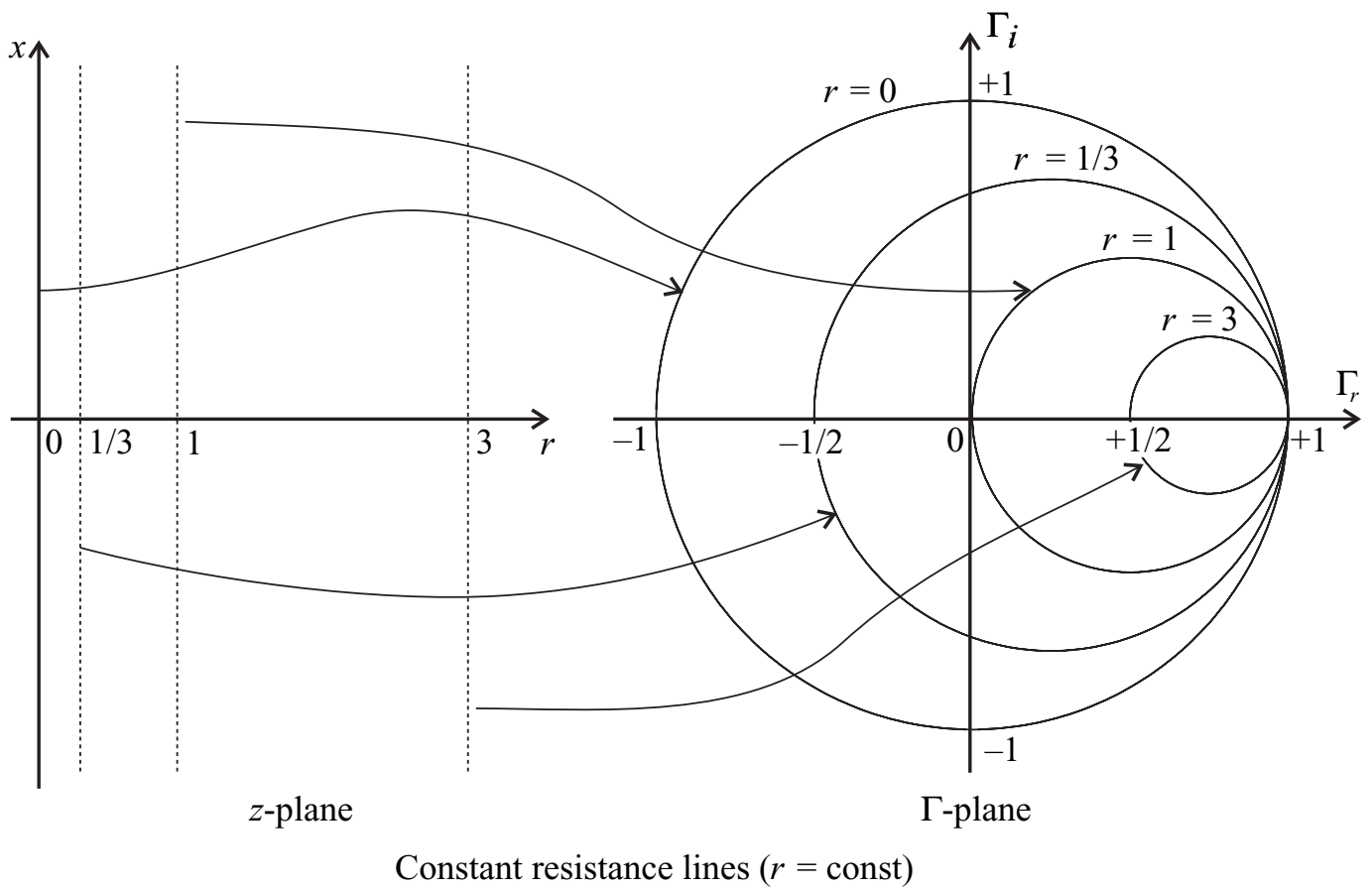


Figure 3-2 Parametric representation of the normalized resistance r in the complex Γ -plane.

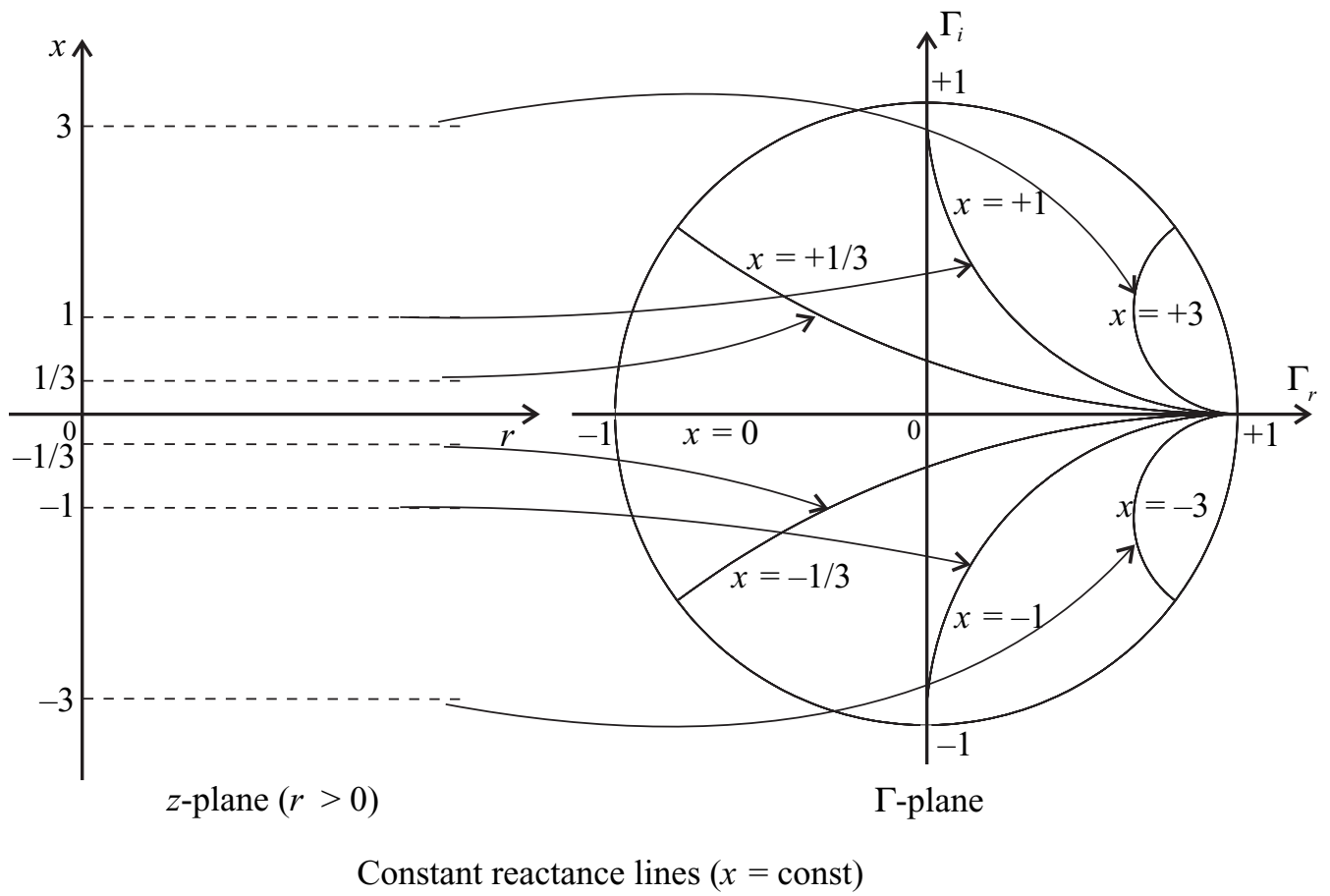


Figure 3-3 Parametric representation of the normalized reactance x in the complex Γ -plane.

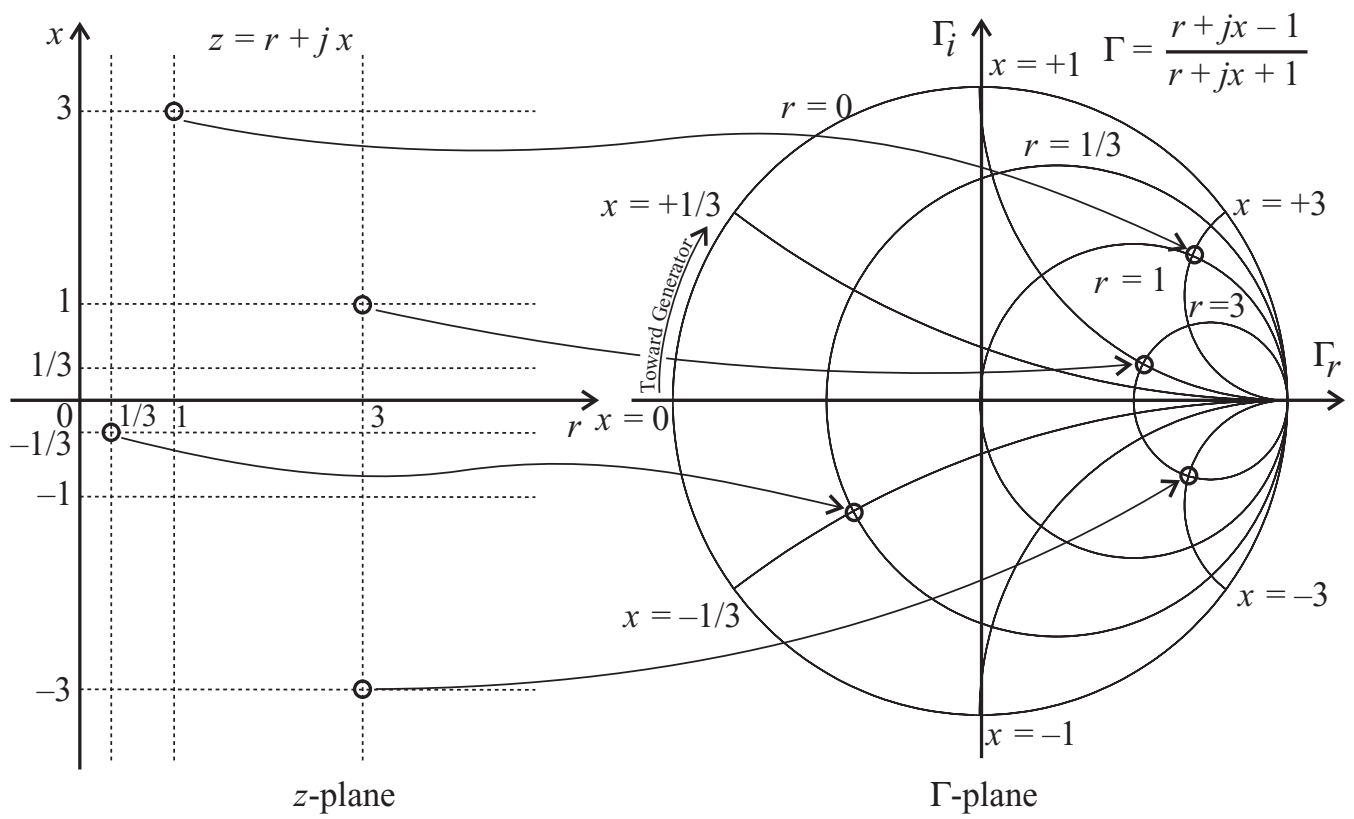


Figure 3-4 Smith Chart representation by combining r and x circles for $|\Gamma| \leq 1$.

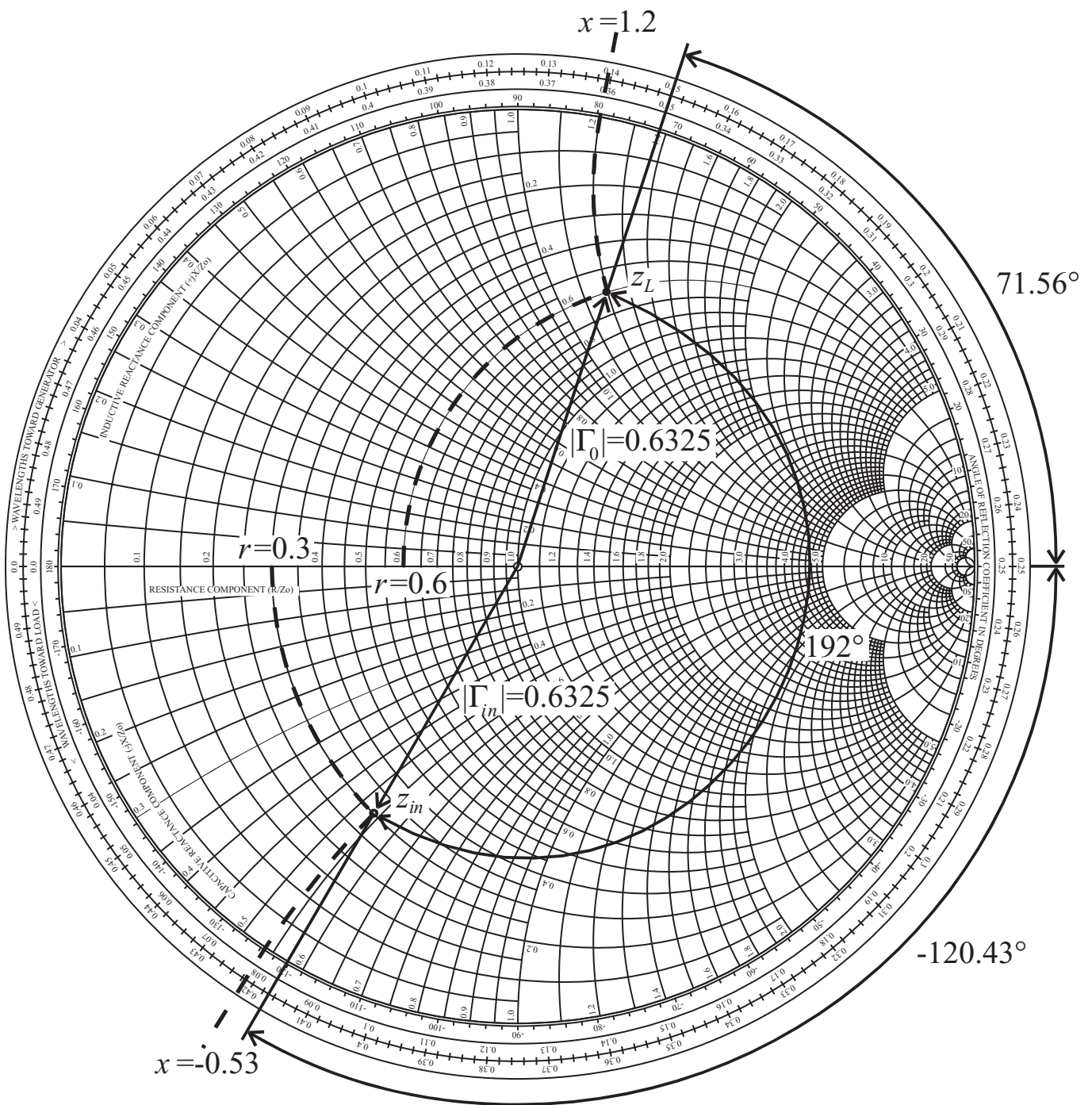


Figure 3-5 Usage of the Smith Chart to determine the input impedance for Example 3-3.

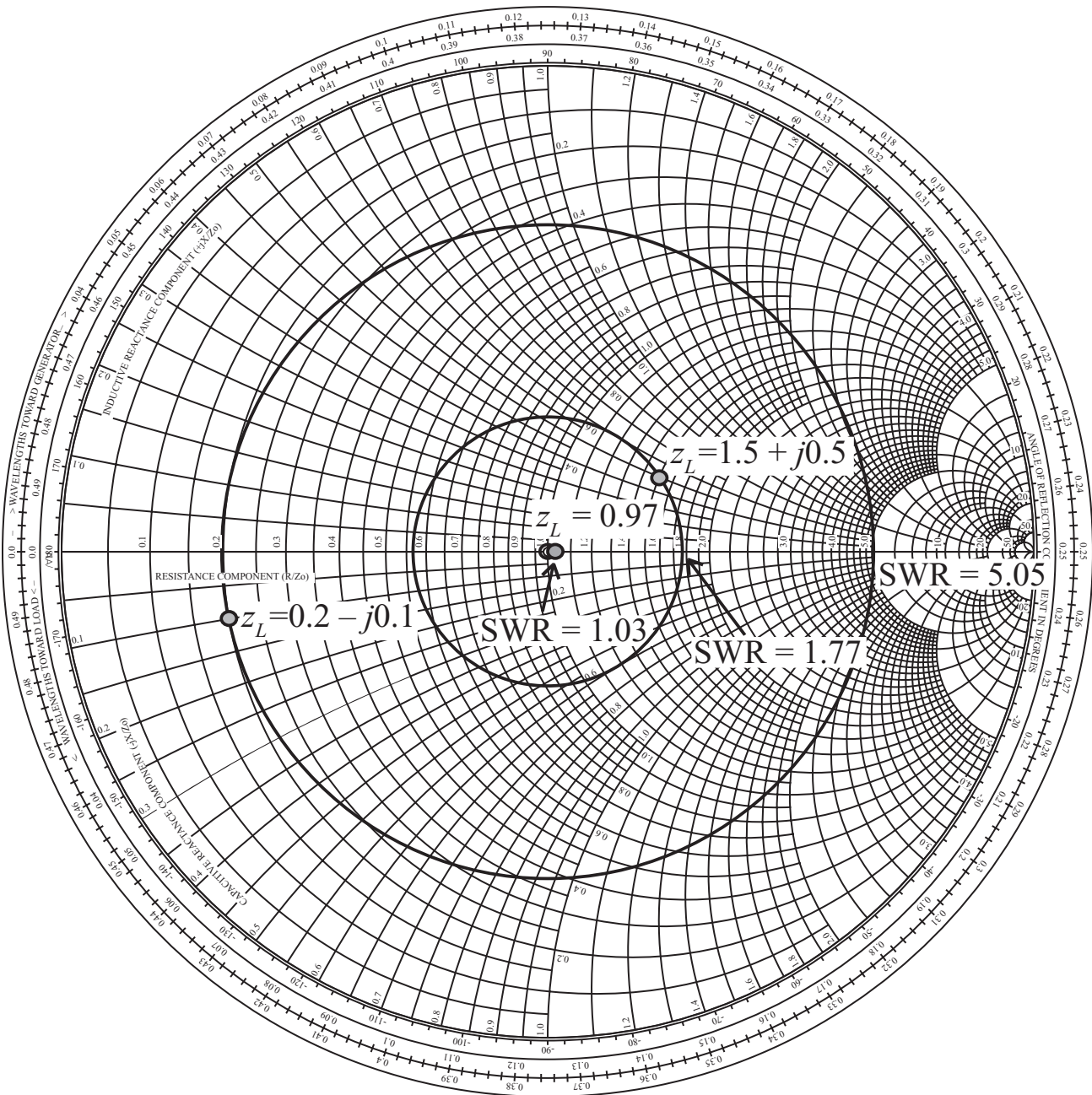


Figure 3-6 SWR circles for various reflection coefficients.

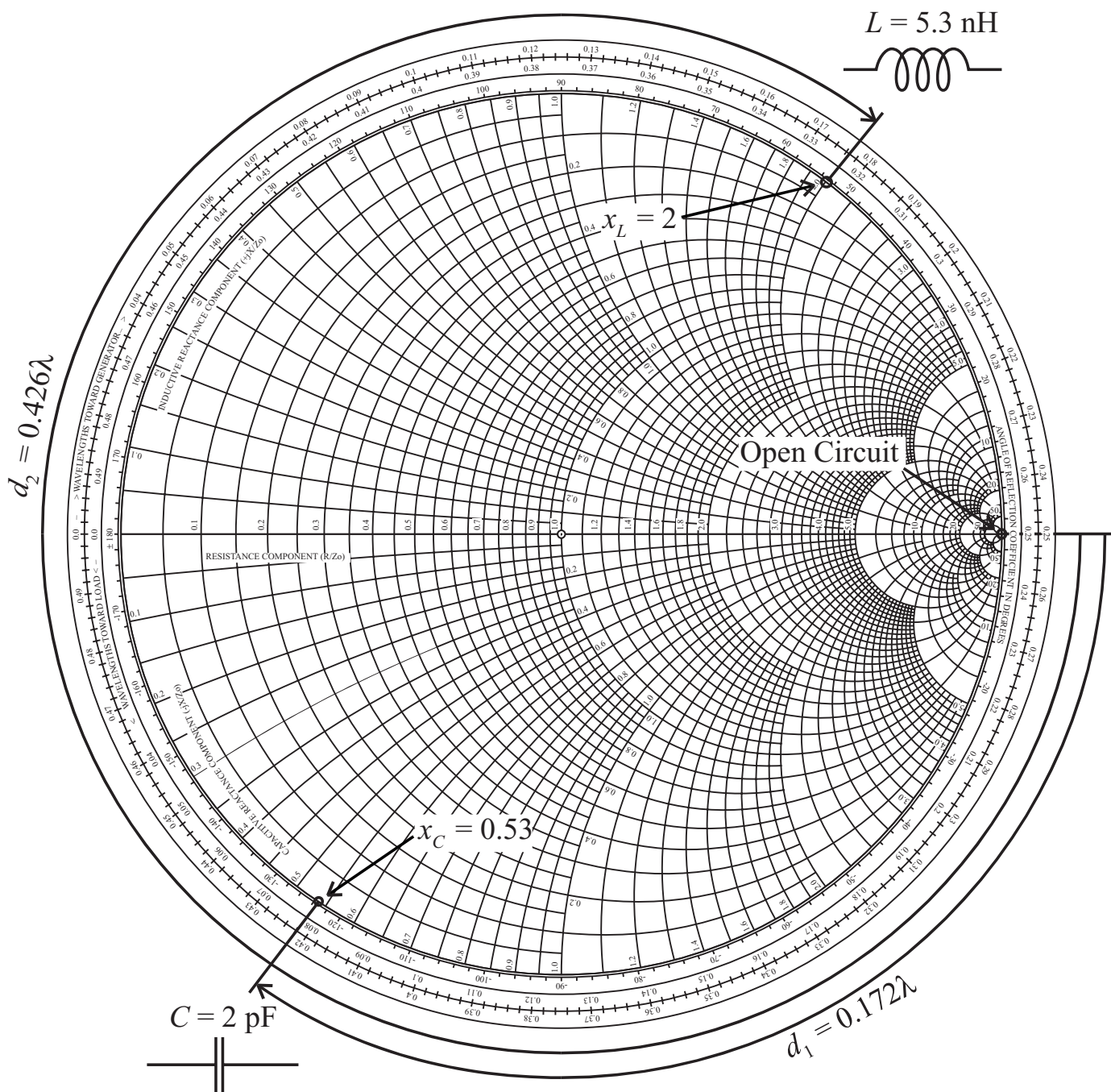


Figure 3-7 Creating capacitive and inductive impedances via an open-circuit transmission line.

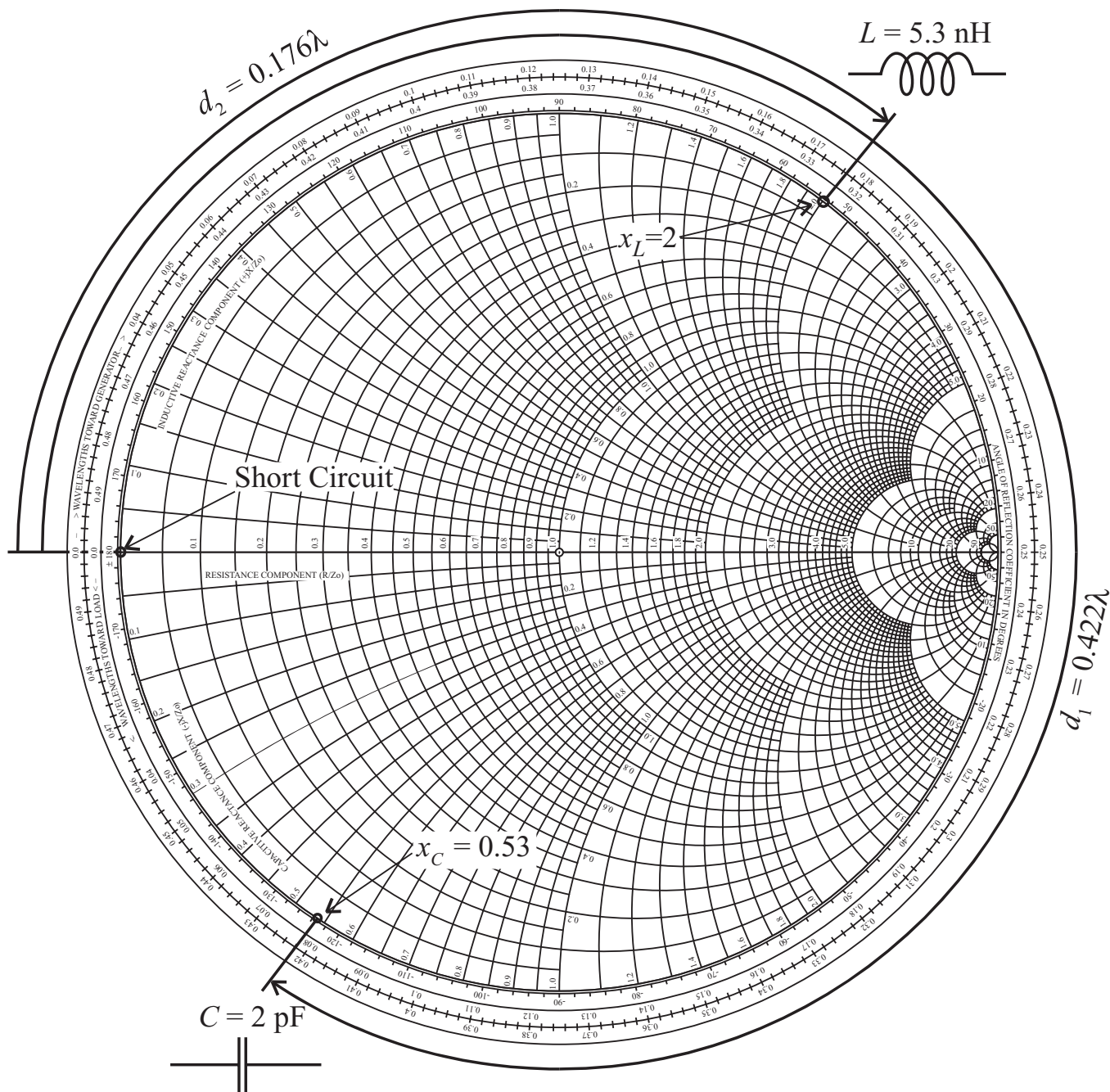


Figure 3-8 Creating capacitive and inductive impedances via a short-circuit transmission line.

```

smith_chart;           % plot smith chart
Set_Z0(50);            % set characteristic impedance to 50 Ohm
s_Load(30+j*60);       % set load impedance to 30+j60 Ohm
vp=0.5*3e8;            % compute phase velocity
f=2e9;                 % set frequency to 2 GHz
d=0.0:0.001:0.03;      % set the line length to a range from 0 to
                        % 3 cm in 1 mm increments
betta=2*pi*f/vp;       % compute propagation constant
Gamma=(ZL-Z0)/(ZL+Z0); % compute load reflection coefficient
rd=abs(Gamma);          % magnitude of the reflection coefficient
alpha=angle(Gamma)-2*betta*d; % phase of the reflection
                        % coefficient
plot(rd*cos(alpha),rd*sin(alpha)); % plot the graph

```

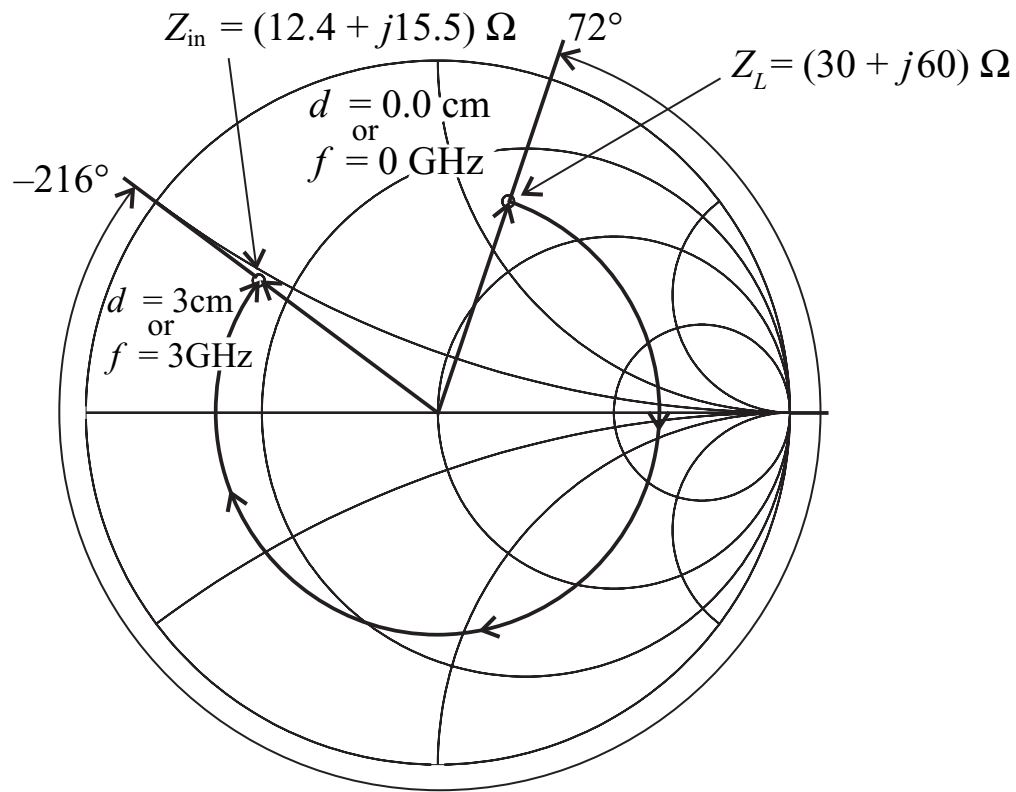


Figure 3-9 Input impedance of a loaded line of 2 cm length for a sweep in operating frequency from 0.0 to 3 GHz. If the operating frequency is fixed at 2 GHz and the line length is varied from 0.0 to 3 cm, the same impedance curve is obtained.

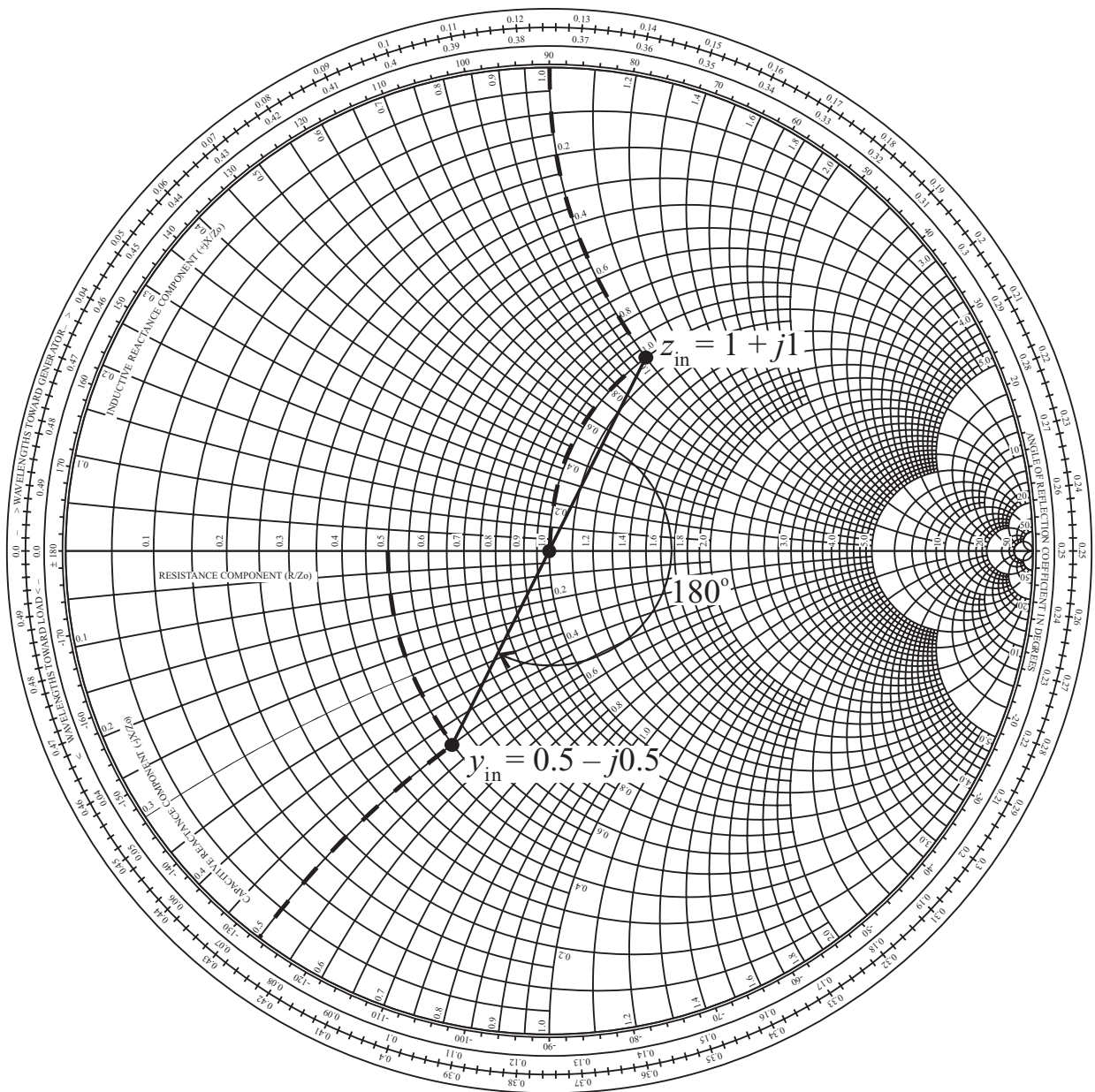
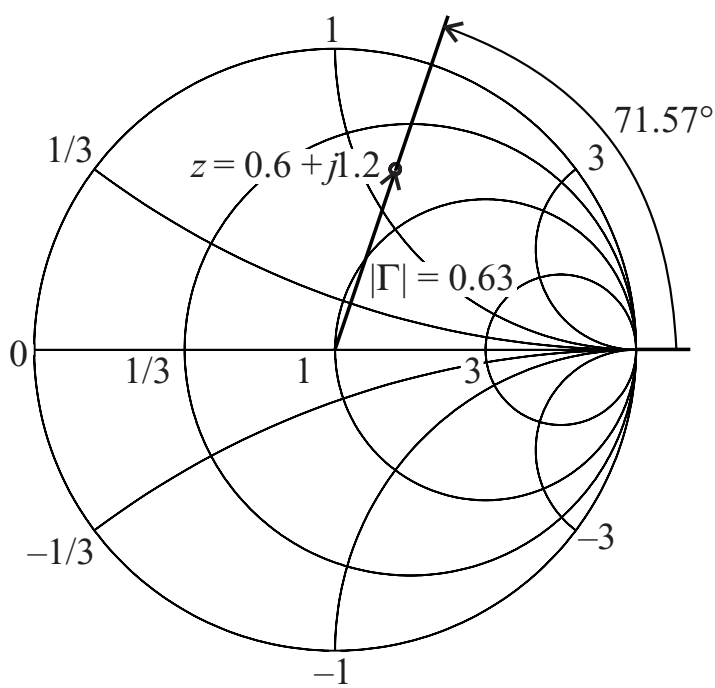
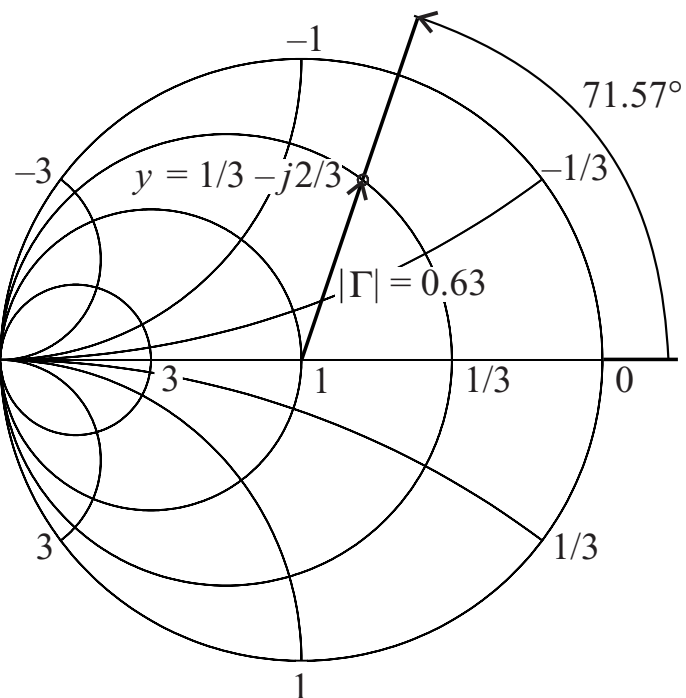


Figure 3-10 Conversion from impedance to admittance by 180° rotation.



(a) Z-Smith Chart



(b) Y-Smith Chart

Figure 3-11 Reinterpretation of the Z-Smith Chart as a Y-Smith Chart.

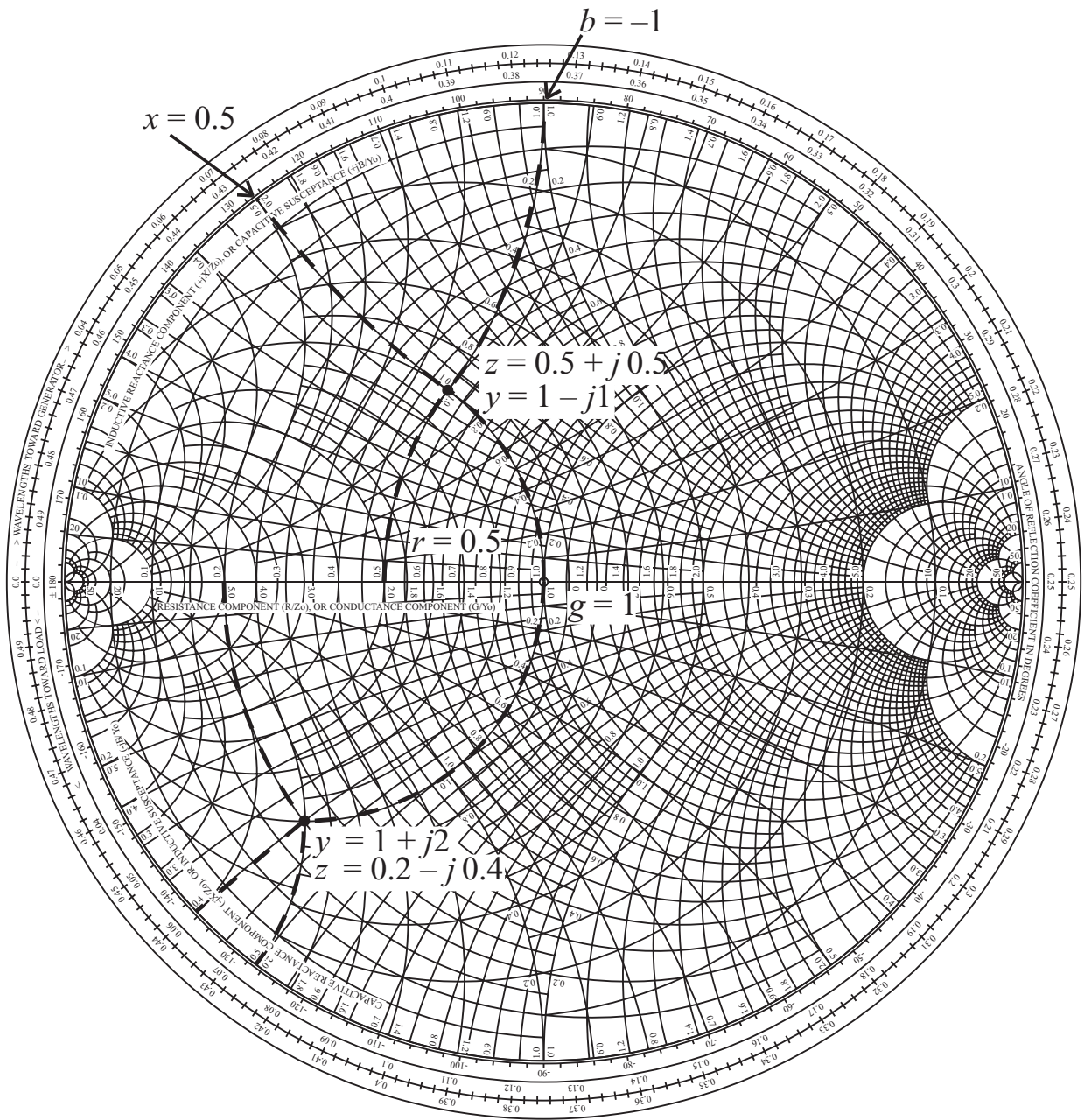


Figure 3-12 The ZY-Smith Chart superimposes the Z- and Y-Smith Charts in one graphical display.

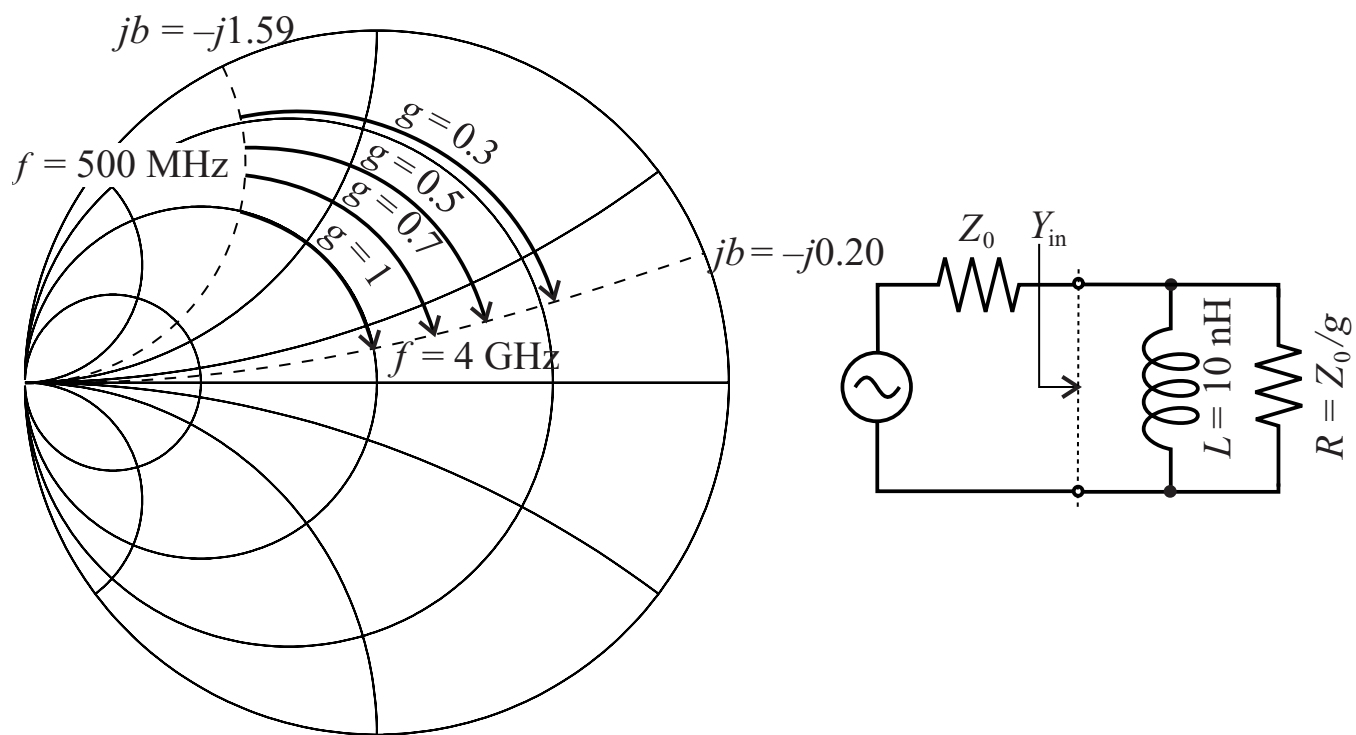


Figure 3-13 Admittance response of parallel RL circuit for $\omega_L \leq \omega \leq \omega_U$ at constant conductances $g = 0.3, 0.5, 0.7$, and 1 .

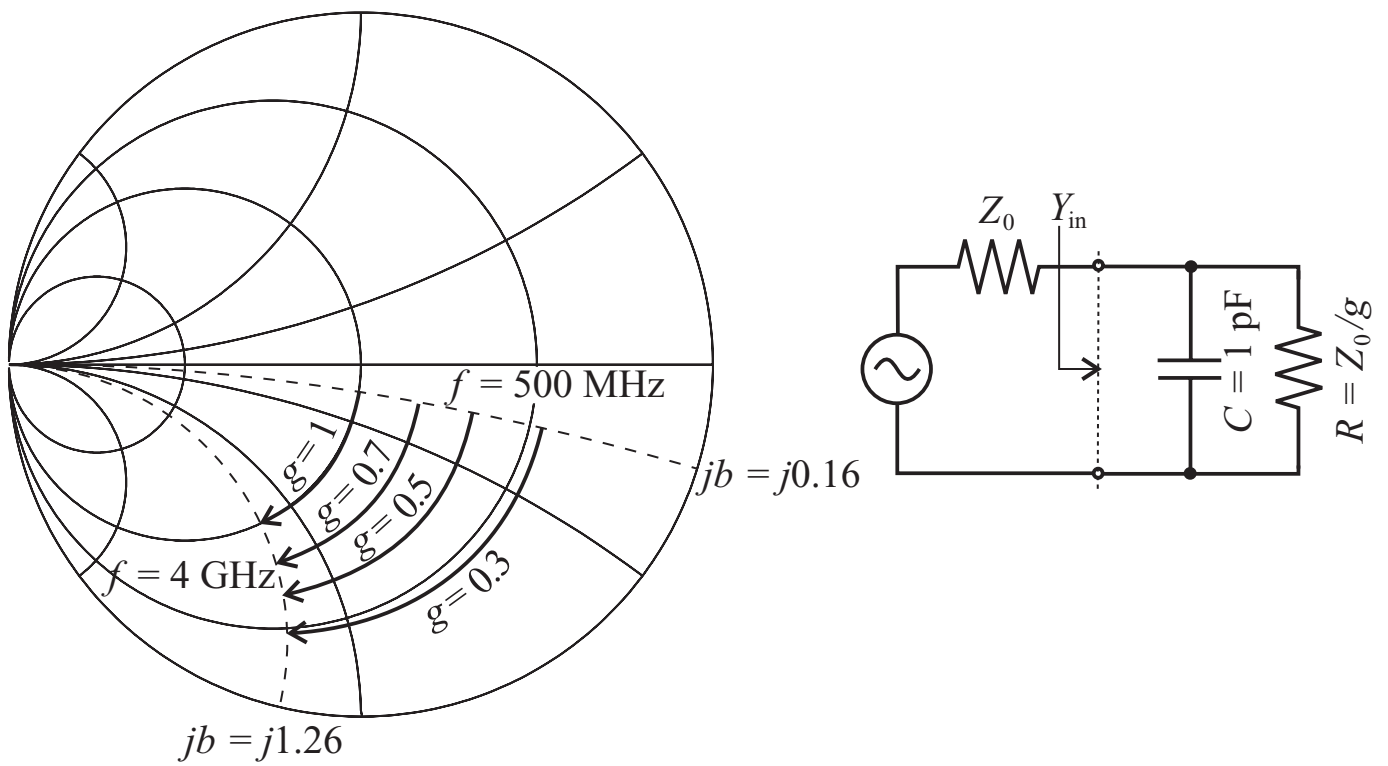


Figure 3-14 Admittance response of parallel RC circuit for $\omega_L \leq \omega \leq \omega_U$ at constant conductances $g = 0.3, 0.5, 0.7$, and 1 .

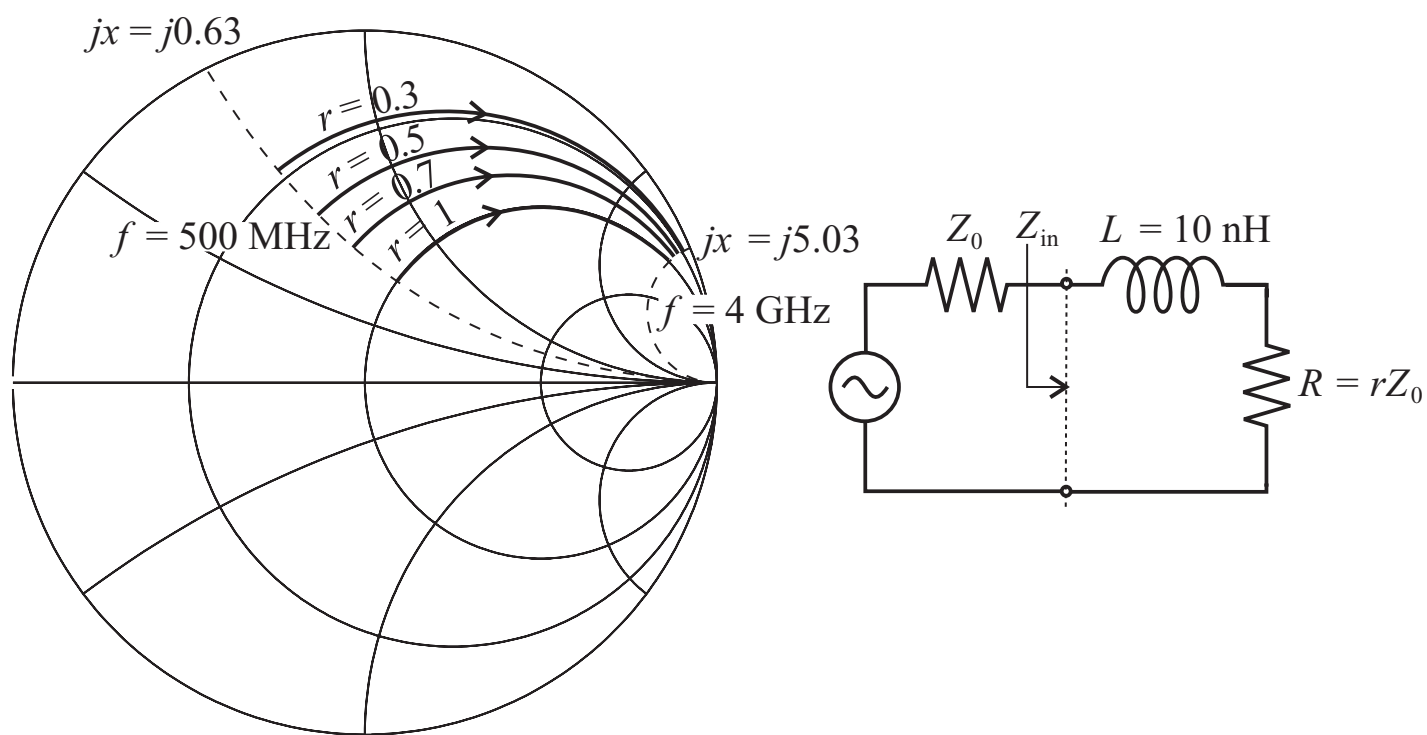


Figure 3-15 Impedance response of series RL circuit for $\omega_L \leq \omega \leq \omega_U$ and constant resistances $r = 0.3, 0.5, 0.7,$ and 1 .

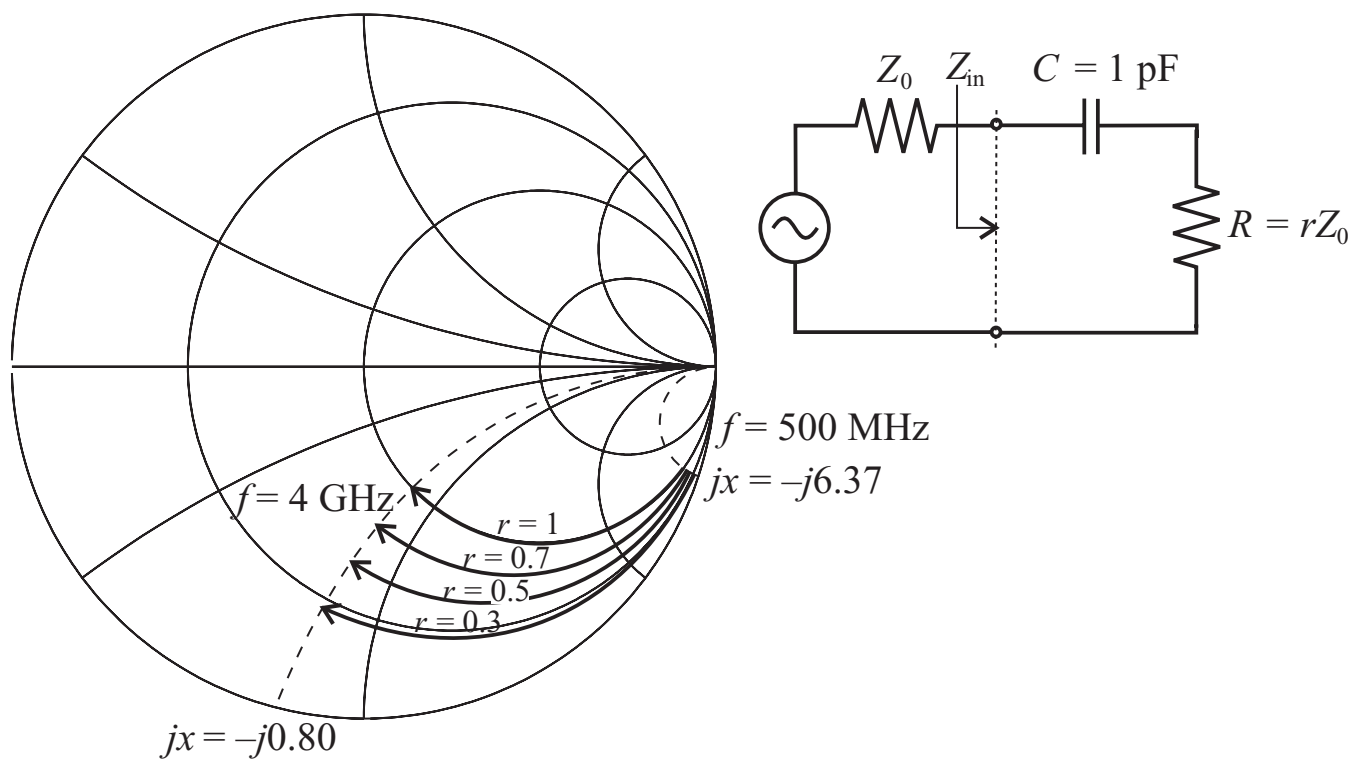


Figure 3-16 Impedance response of series RC circuit for $\omega_L \leq \omega \leq \omega_U$ at constant resistances $r = 0.3, 0.5, 0.7, \text{ and } 1$.

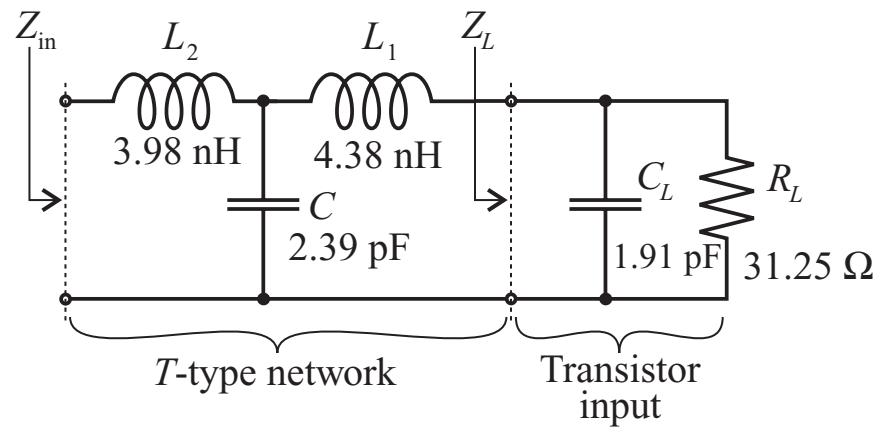


Figure 3-17 T network connected to the base-emitter input impedance of a bipolar transistor.

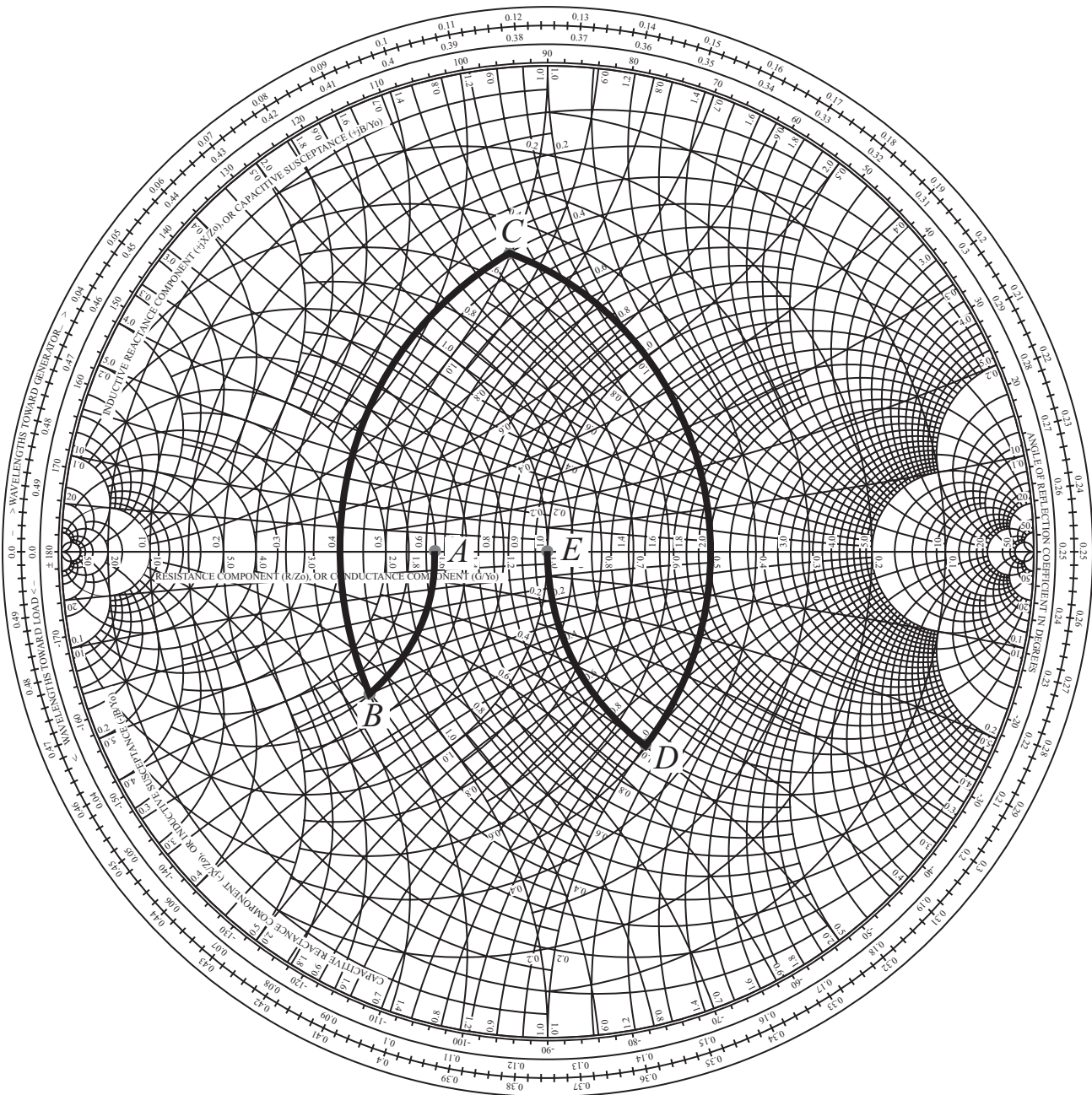


Figure 3-18 Computation of the normalized input impedance of the T network shown in Figure 3-17 for a center frequency $f = 2$ GHz.

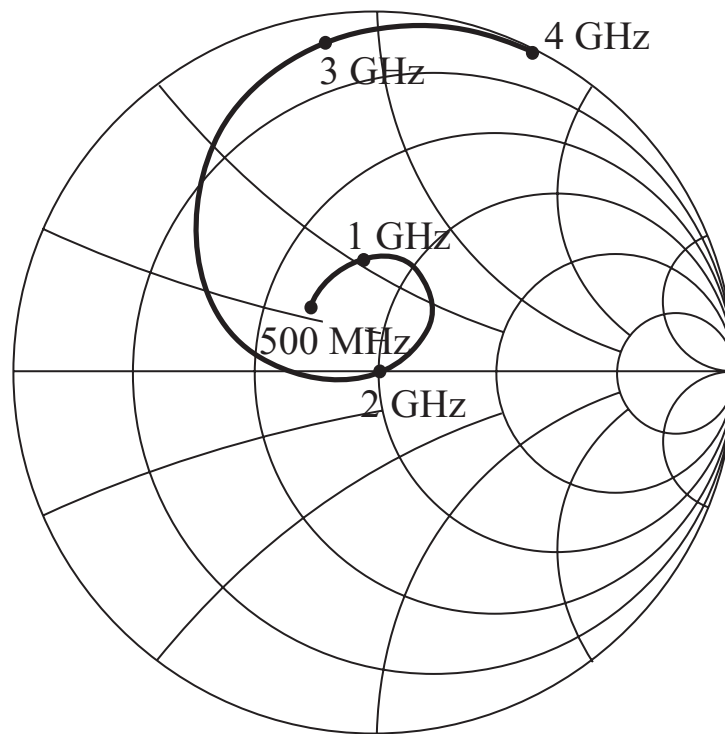


Figure 3-19 CAD simulation of the normalized input impedance Z_{in} for the network depicted in Figure 3-17 over the entire frequency range $500 \text{ MHz} \leq f \leq 4 \text{ GHz}$.