

第三次小考

1. (20%) Use mesh analysis to find the branch currents i_a and i_b in the circuit seen in Fig. 1 if $v_a = 50\sin(10^7 t)$ V and $v_b = 25\cos(10^7 t + 90^\circ)$ V.

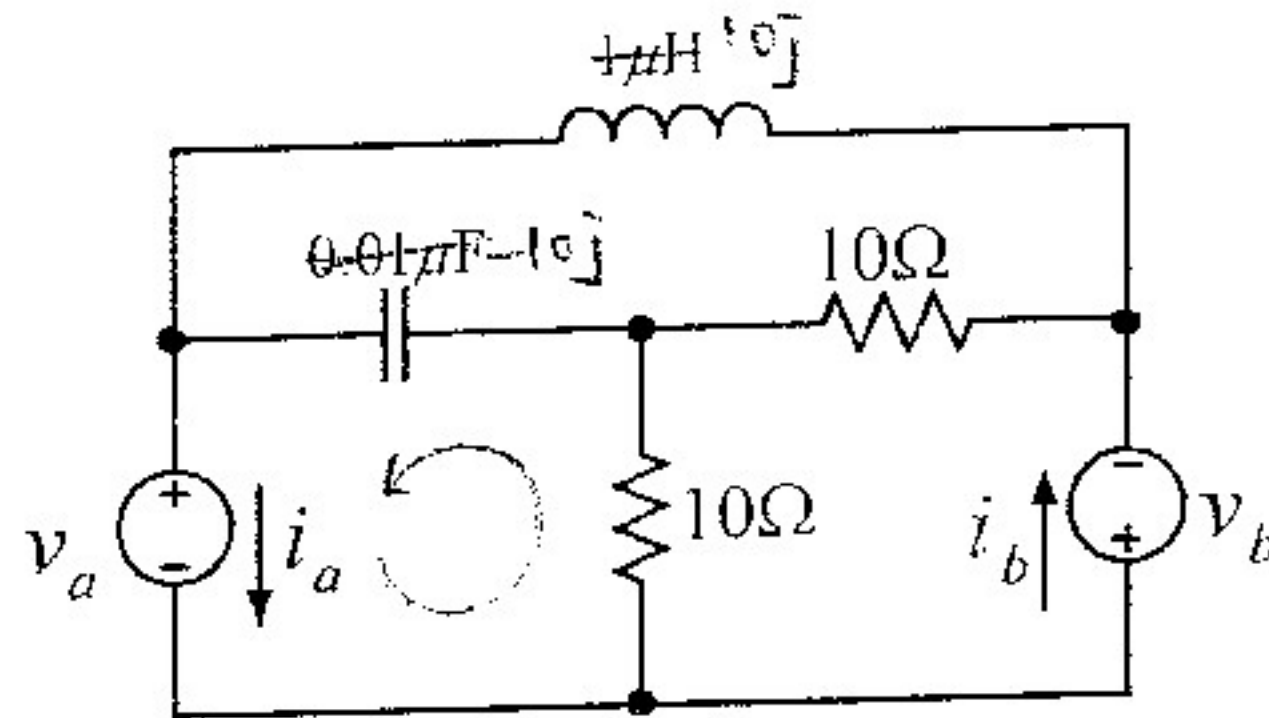


Fig. 1

2. The load impedance Z_L for the circuit shown in Fig. 2 is adjusted until maximum average power is delivered to Z_L .
- (a) (25%) Find the load impedance Z_L that draws the maximum average power and calculate the resulting value of P_{\max} .
- (b) (20%) Find the power transfer efficiency Eff in this case.

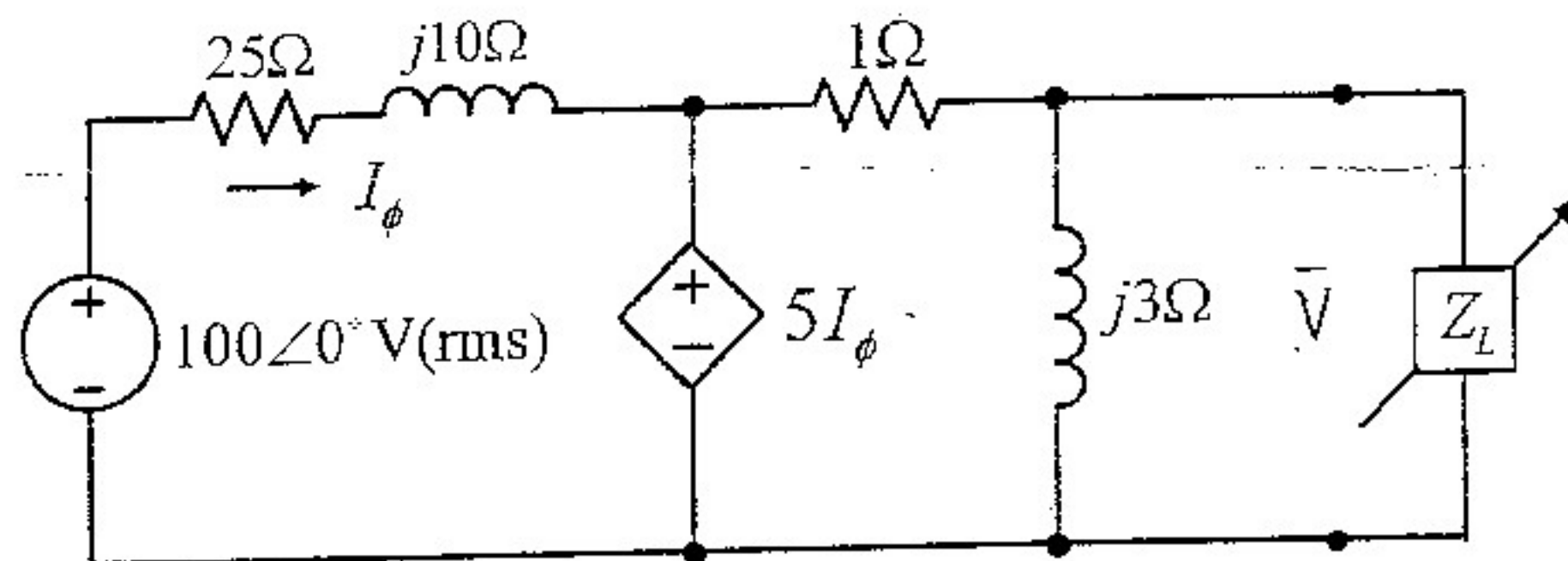


Fig. 2

3. Two loads are connected in parallel with a $|V| = 1$ kV(rms) 60-Hz AC source. The individual power factors and currents are:
- pf1 = 0.28 lagging, $|I_1| = 50$ A(rms)
- pf2 = 1.0, $|I_2| = 40$ A(rms)
- (a) (15%) Find the complex power and rms current from the source, and calculate the power factor of the combined loads.
- (b) (20%) A capacitor is now added in parallel and the system power factor becomes 0.9 lagging. Find the current drawn from the source and the capacitor value.