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ROLL NO: 18EX20030

Lab Assignment

Computation of Apparent Resistivity and phase for plane wave EM over a multi-layered earth model

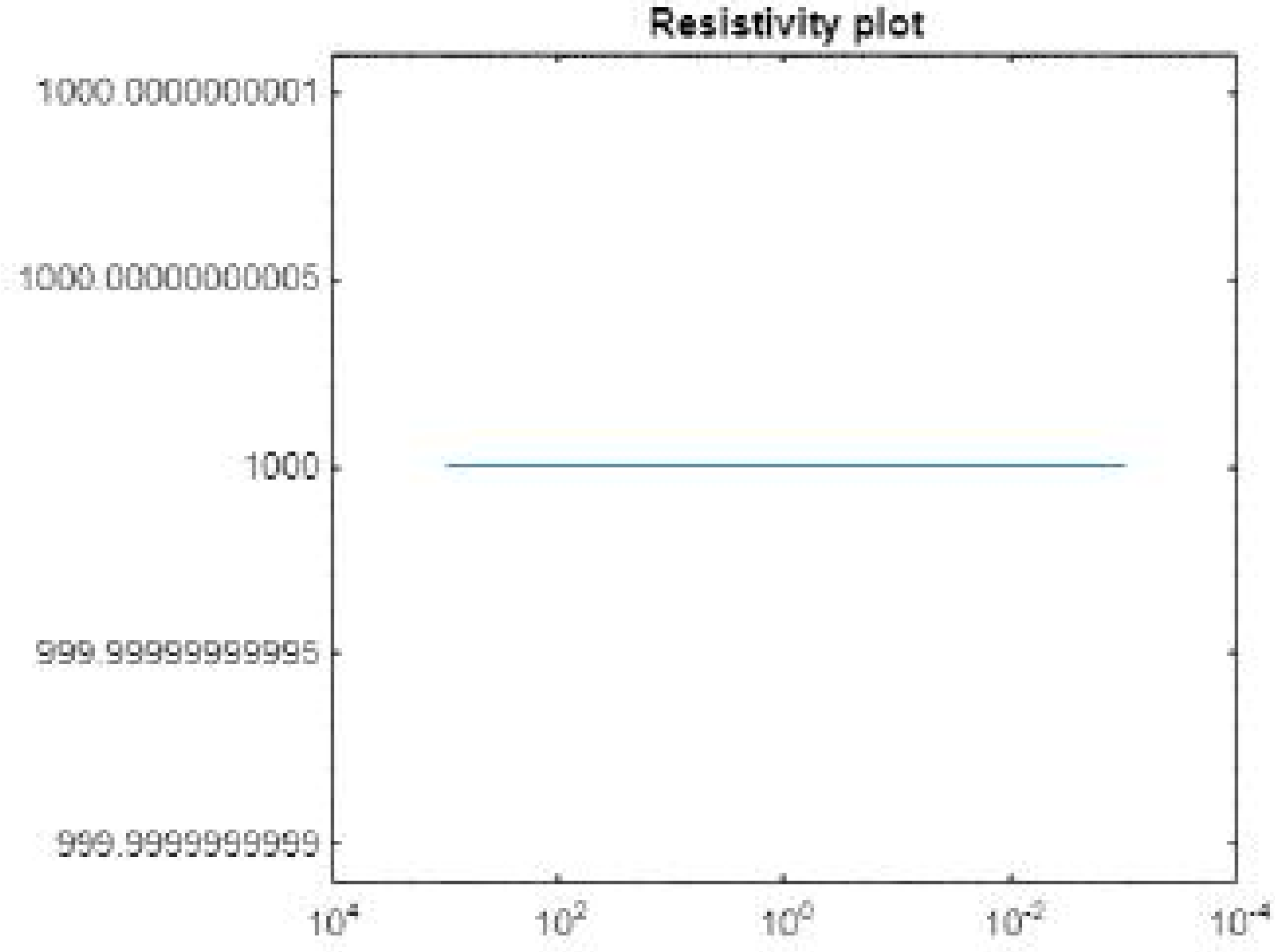
For 3 layer Earth model n=3 in the code

For 2 layer Earth model n=2 in the code

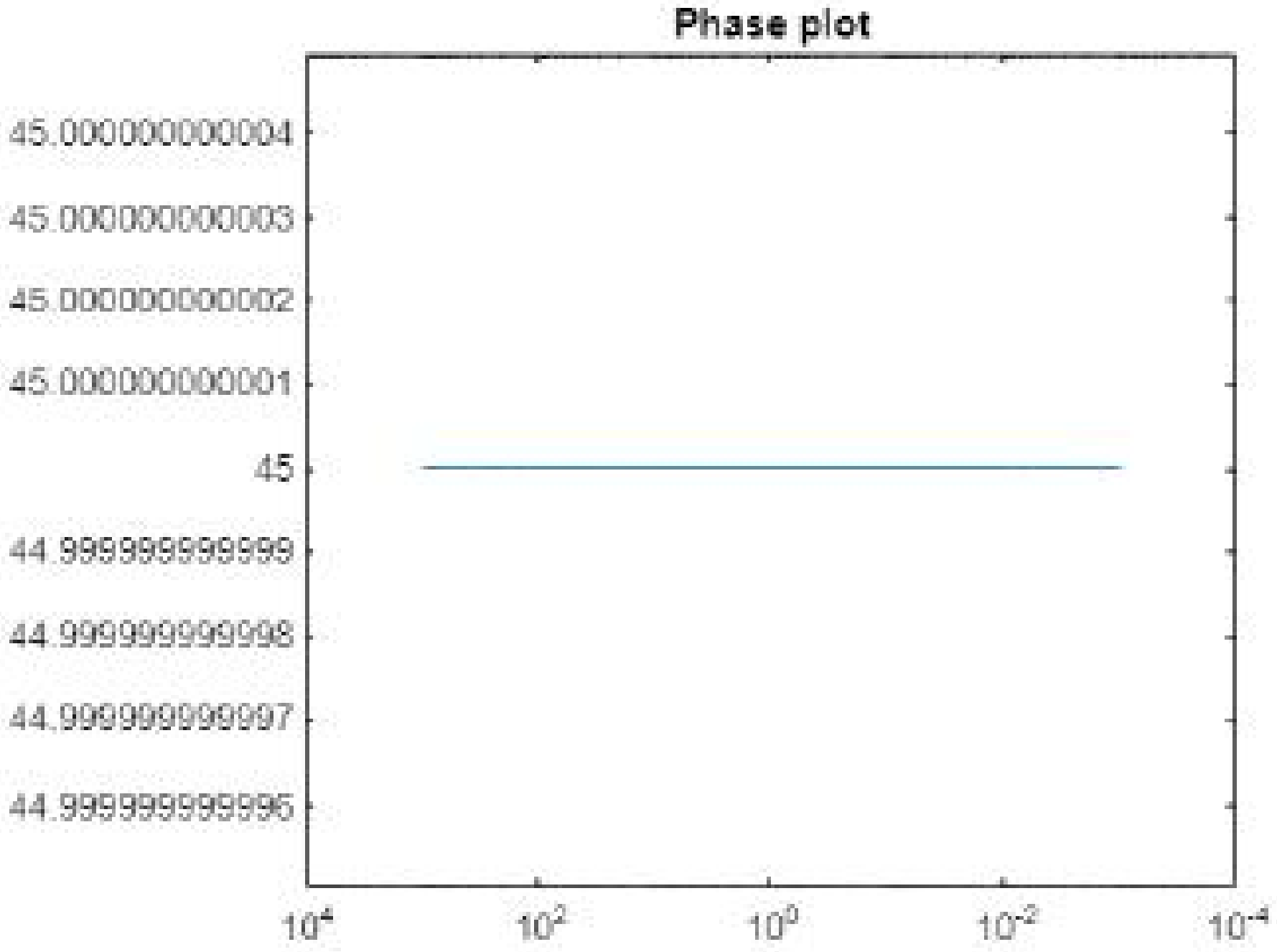
a) Rho = [1000,1000], h=[2000]

```
f = [1000 700 500 300 200 150 100 70 50 30 20 15 10 7 5 3 2 1.5 1 0.7 0.5 0.3
0.2 0.15 0.1 0.07 0.05 0.03 0.02 0.015 0.01 0.007 0.005 0.003 0.002 0.0015
0.001];
om = 2*pi*f;
rho =[x1 x2 x3];
h = [y1 y2];
mu = 4*pi*10^(-7);
K = sqrt(j*om*mu);
n = 2;
for i = 1:length(f)
Z(n) = K(i)*sqrt(rho(n));
for p = n:-1:2
T(p-1) = K(i)*sqrt(rho(p-1))*tanh(K(i)*h(p-1)/(sqrt(rho(p-1))));
S(p-1) = tanh(K(i)*h(p-1)/(sqrt(rho(p-1))))/(K(i)*sqrt(rho(p-1)));
Z(p-1) = (Z(p) + T(p-1))/((Z(p)*S(p-1))+1);
end
pa(i) = (abs(Z(1))^2)/(om(i)*mu);
phase(i) = (180/pi)*angle(Z(1));
end
loglog(f,pa);
hold on;
set (gca, 'xdir', 'reverse')
figure;
semilogx(f,phase);
hold on;
set (gca, 'xdir', 'reverse')
```

Apparent resistivity vs Frequency Plot

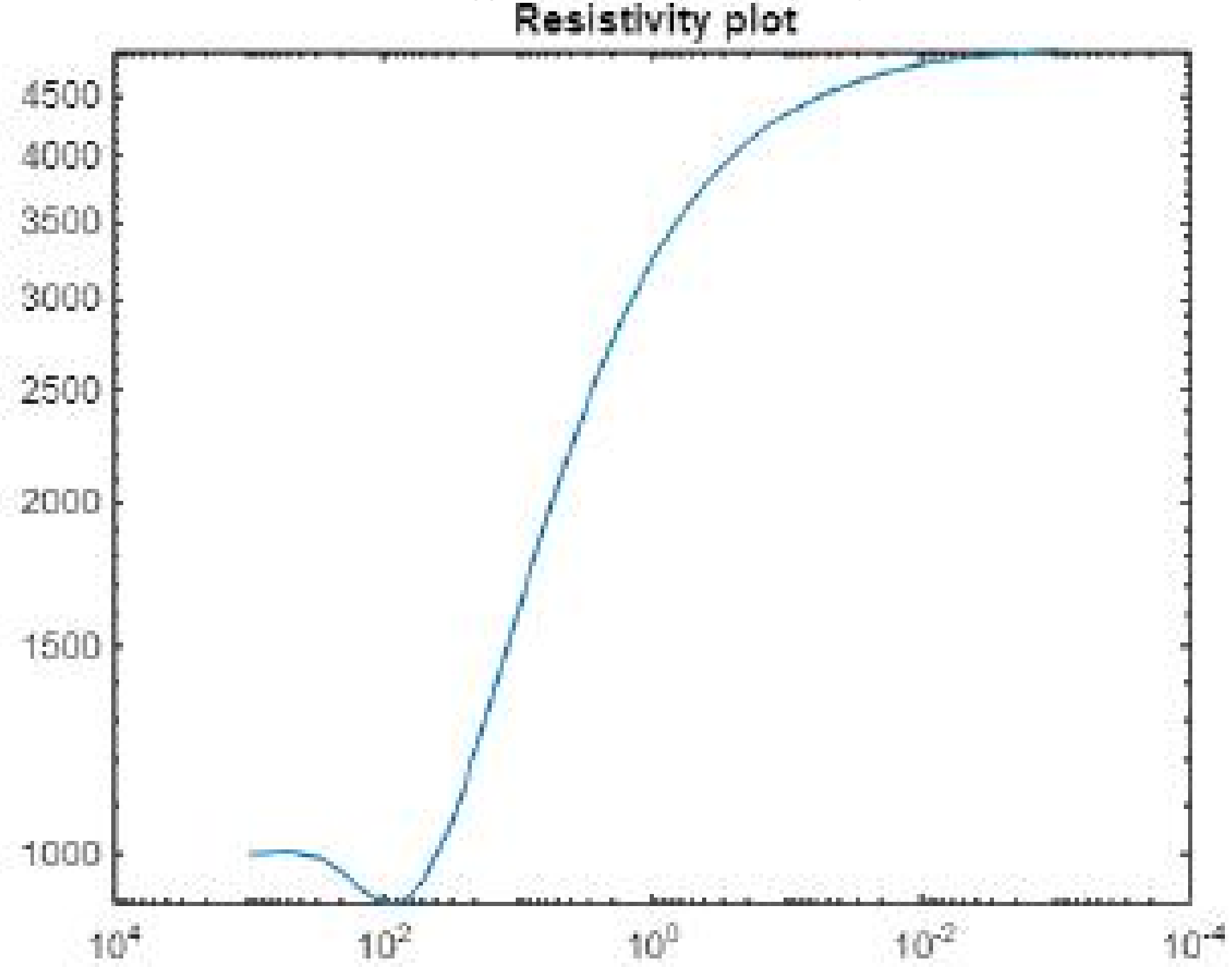


Phase vs Frequency Plot

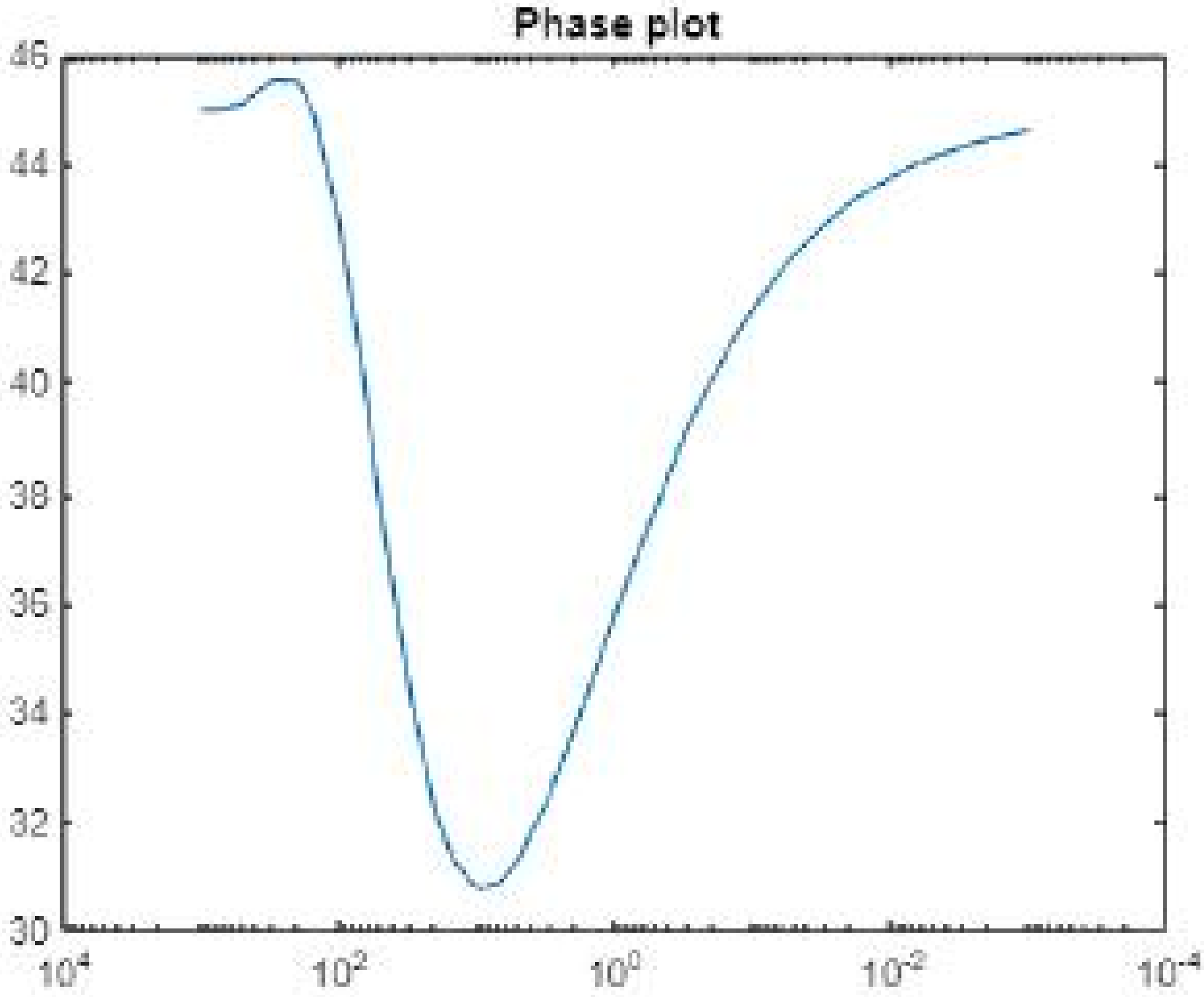


b) Rho = [1000 5000] , h = [2000]

Apparent resistivity vs Frequency Plot

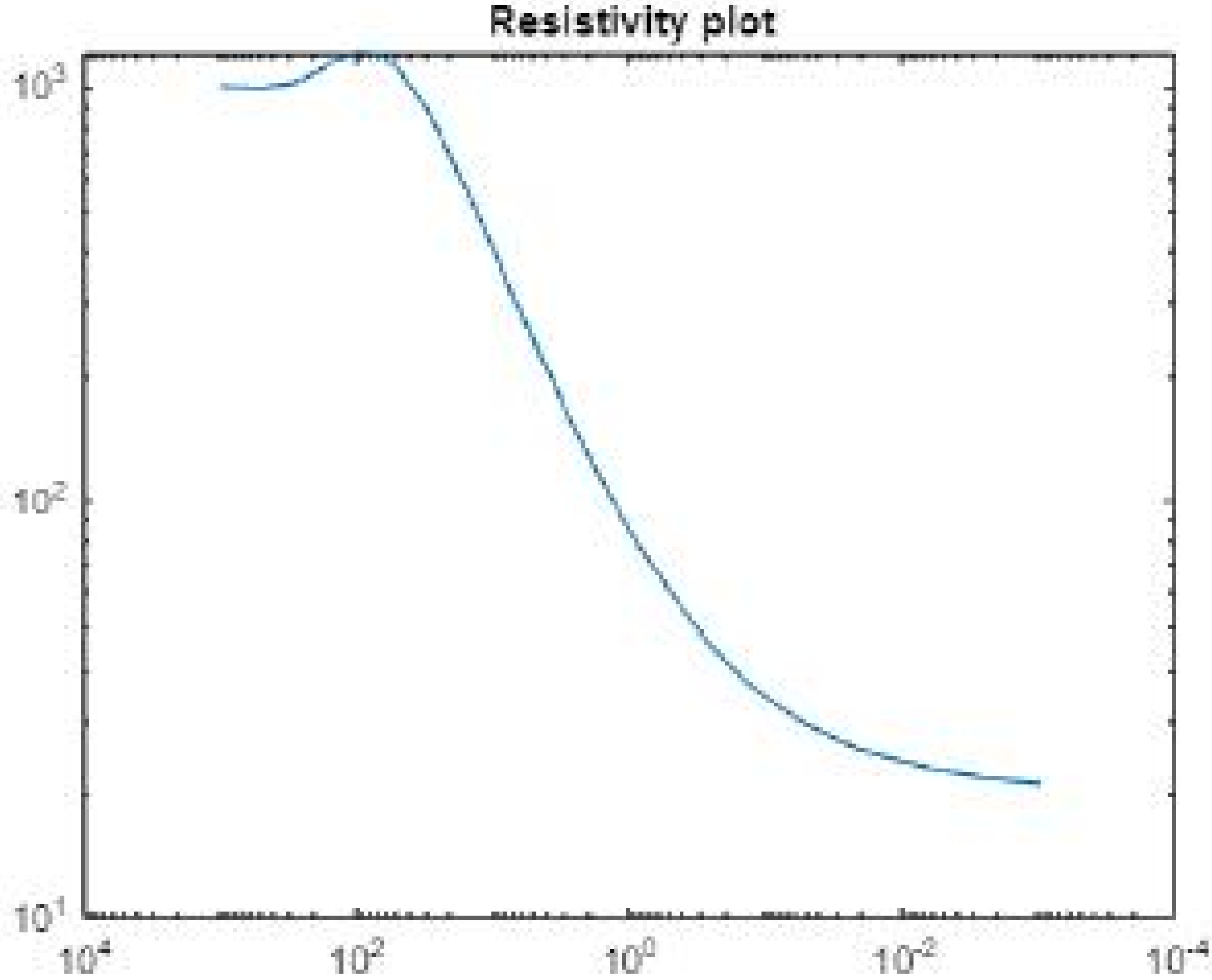


Phase vs Frequency Plot

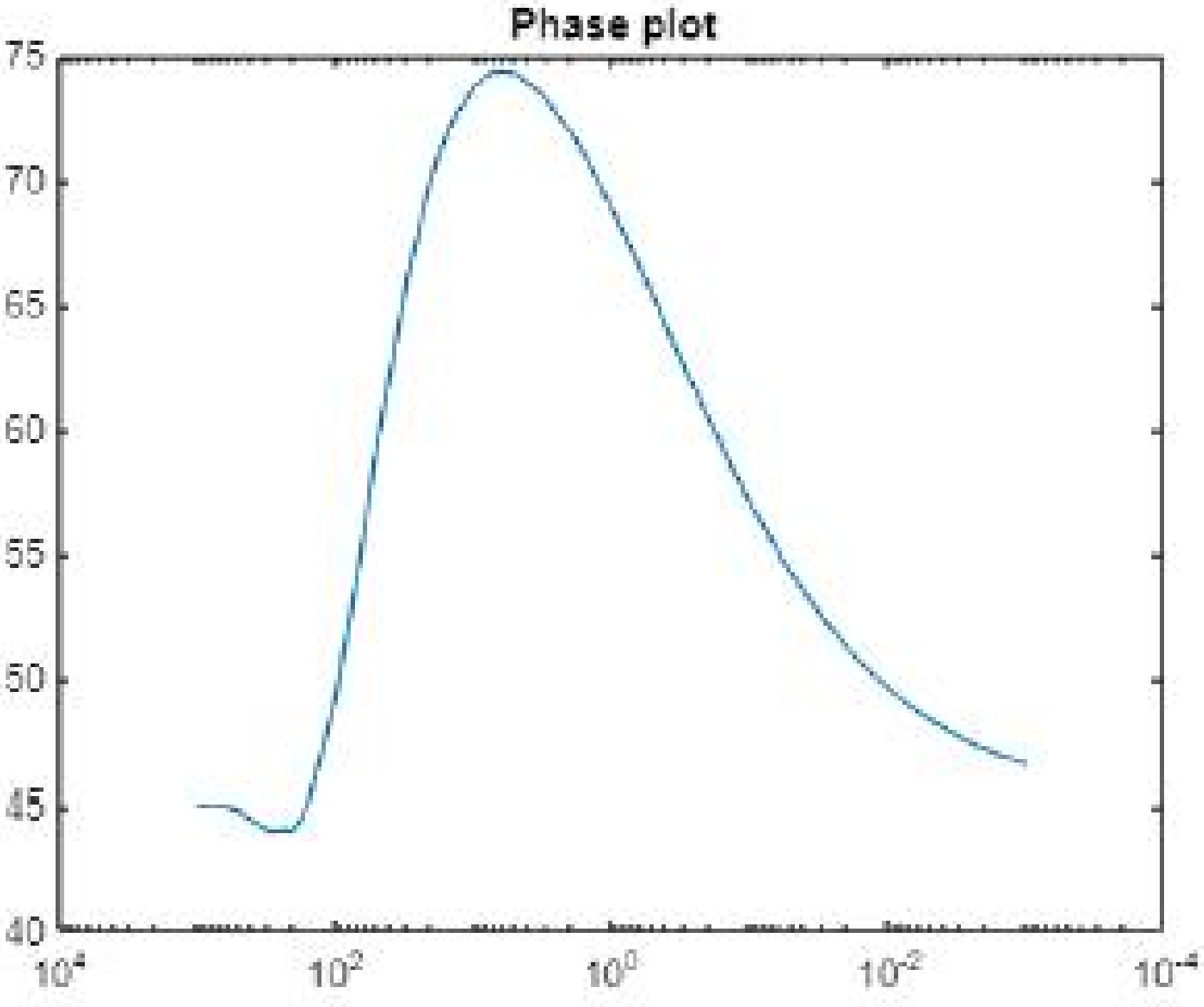


c) Rho = [1000 20] , h = [2000]

Apparent resistivity vs Frequency Plot



Phase vs Frequency Plot

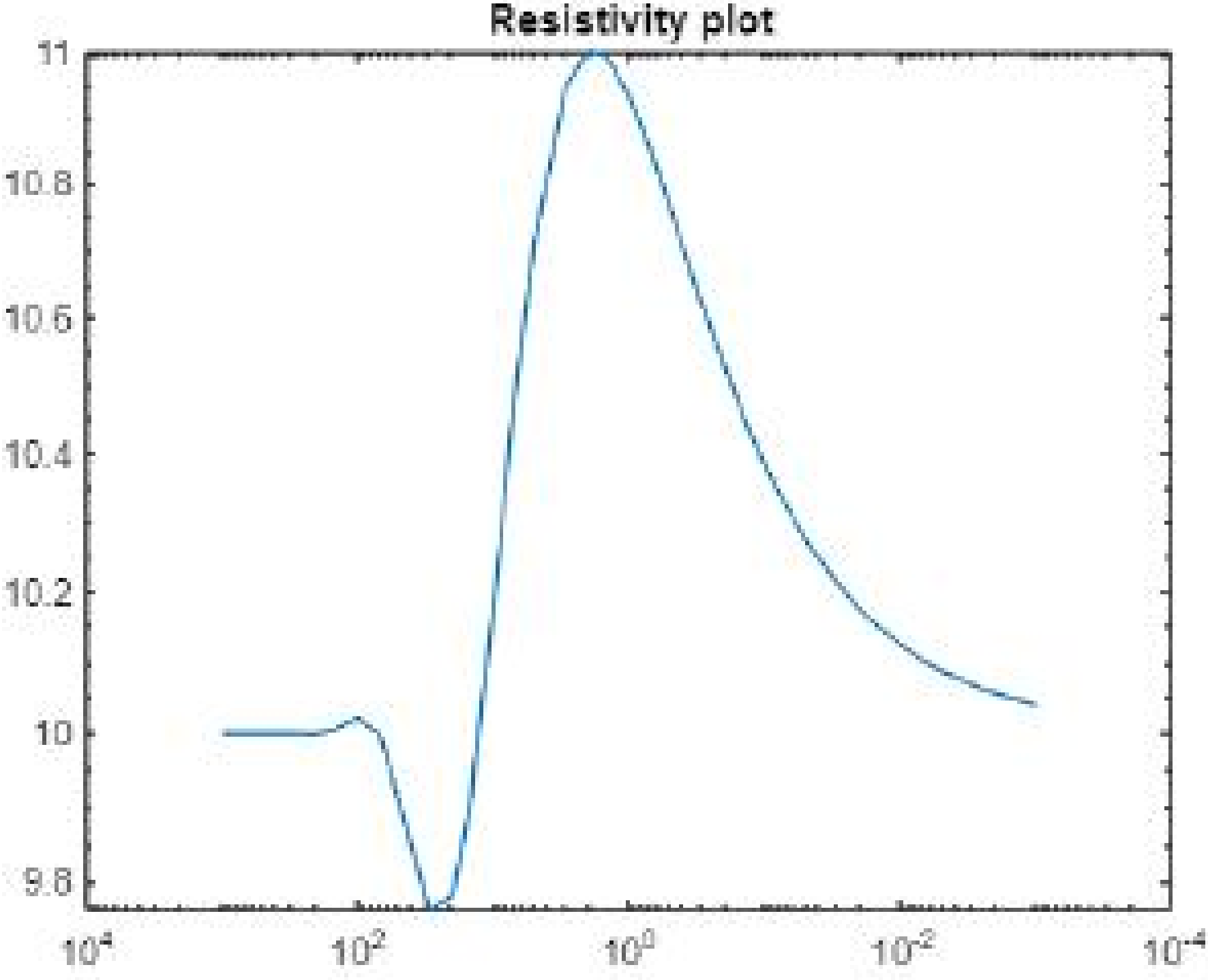


3 layer model

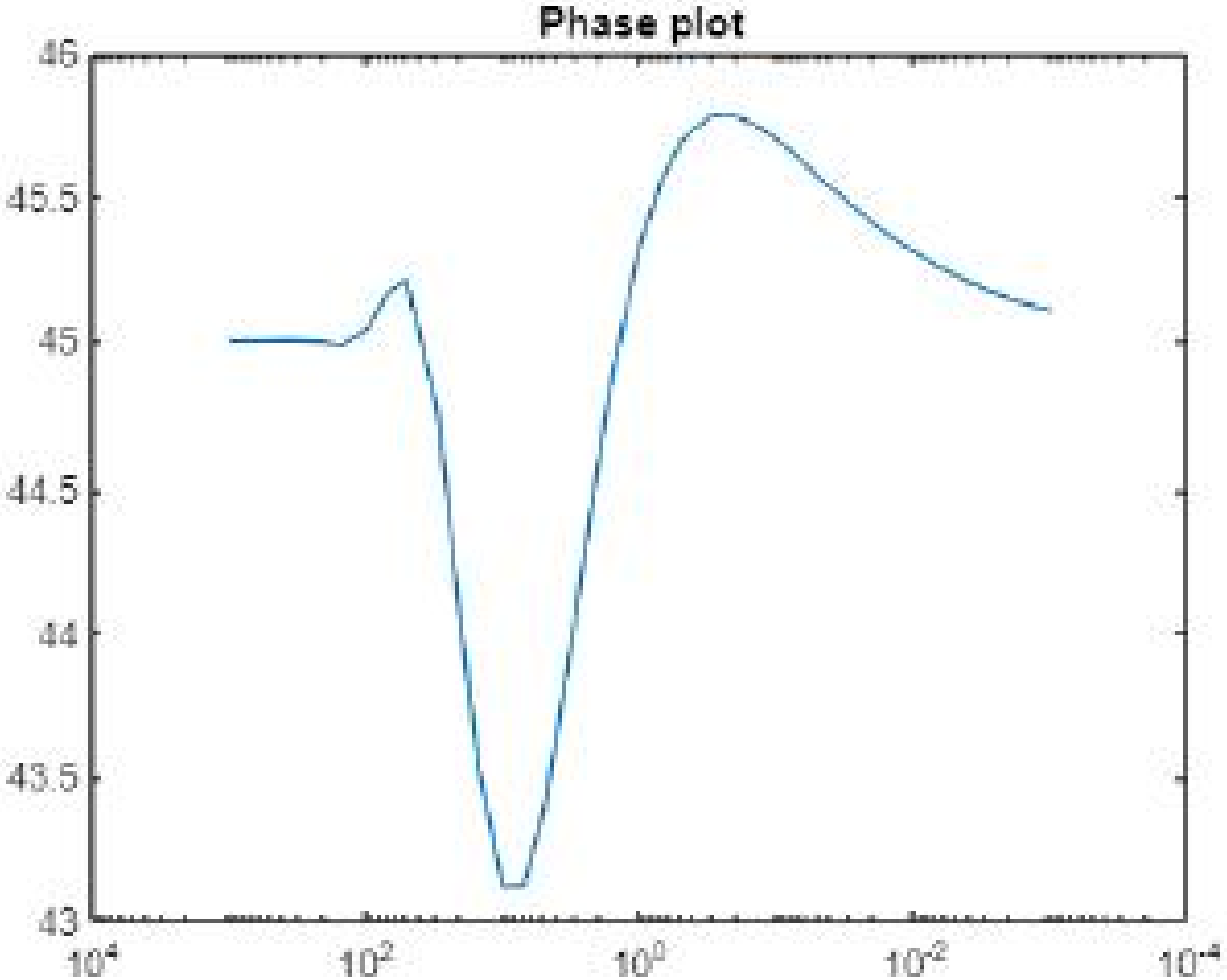
a) Resistive intermediate level-K-type

Rho = [10 500 10] , h = [500 100]

Apparent resistivity vs Frequency Plot



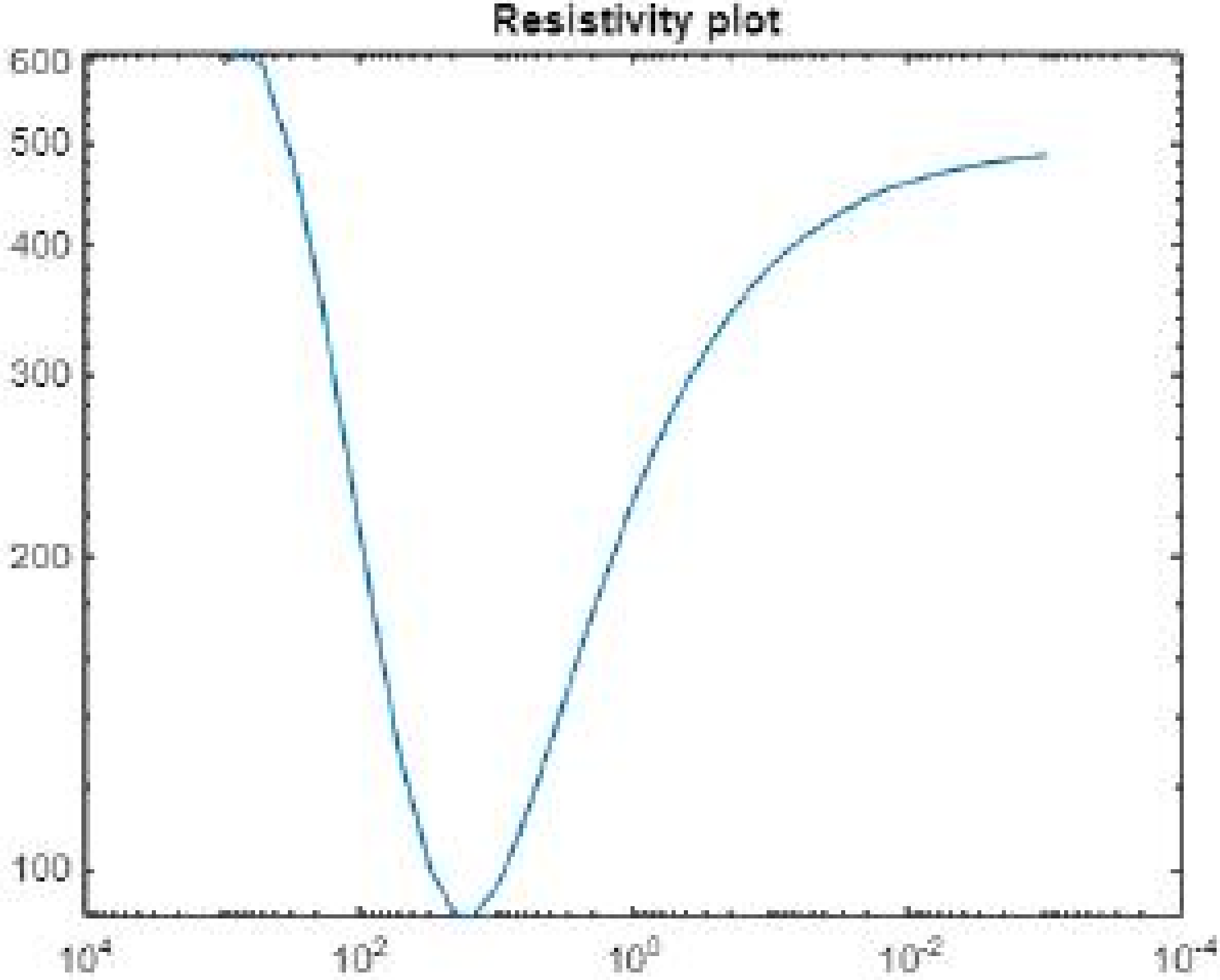
Phase vs Frequency Plot



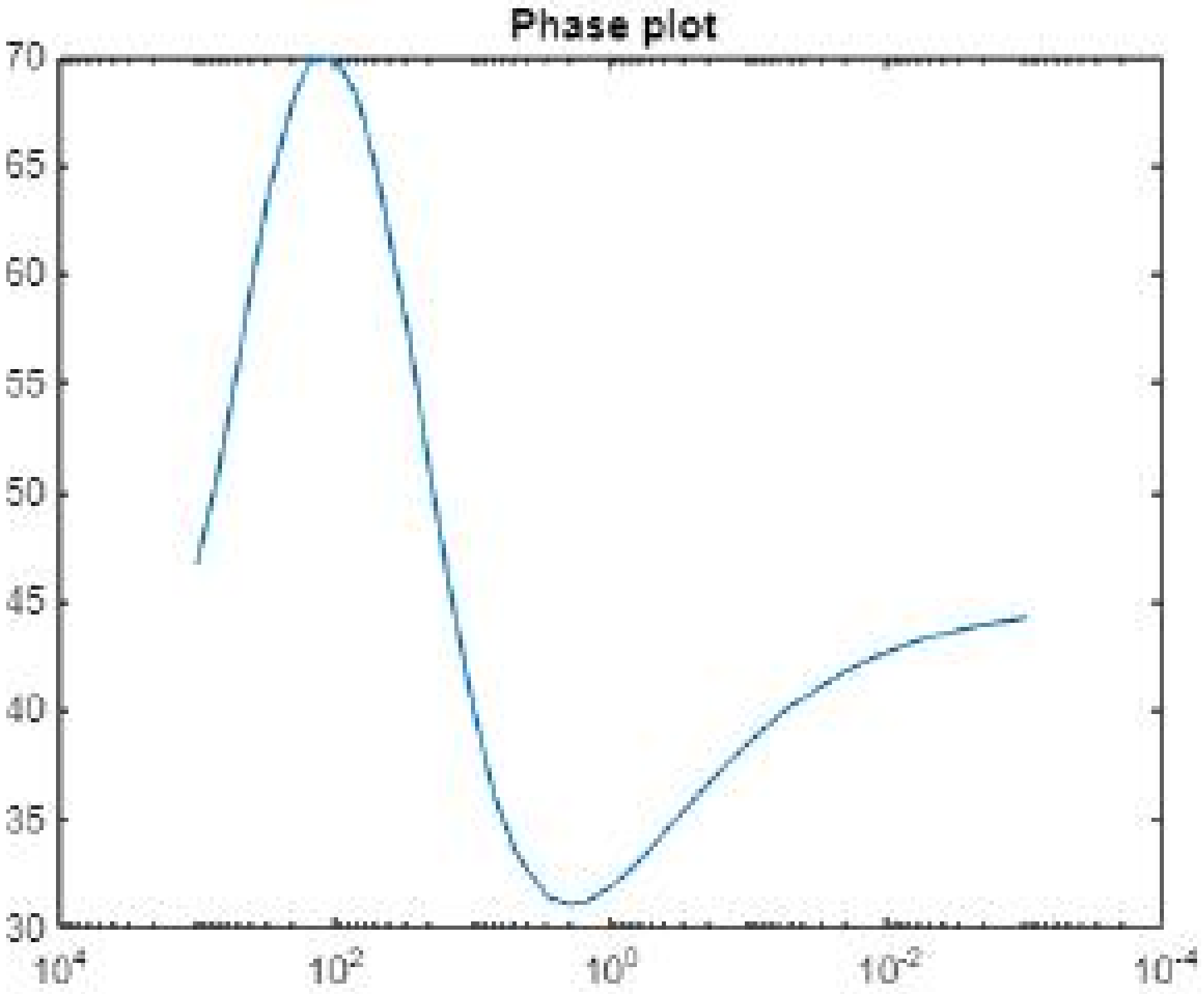
a) conductive intermediate level-H-type

Rho = [500 10 5-00] , h = [500 100]

Apparent resistivity vs Frequency Plot



Phase vs Frequency Plot

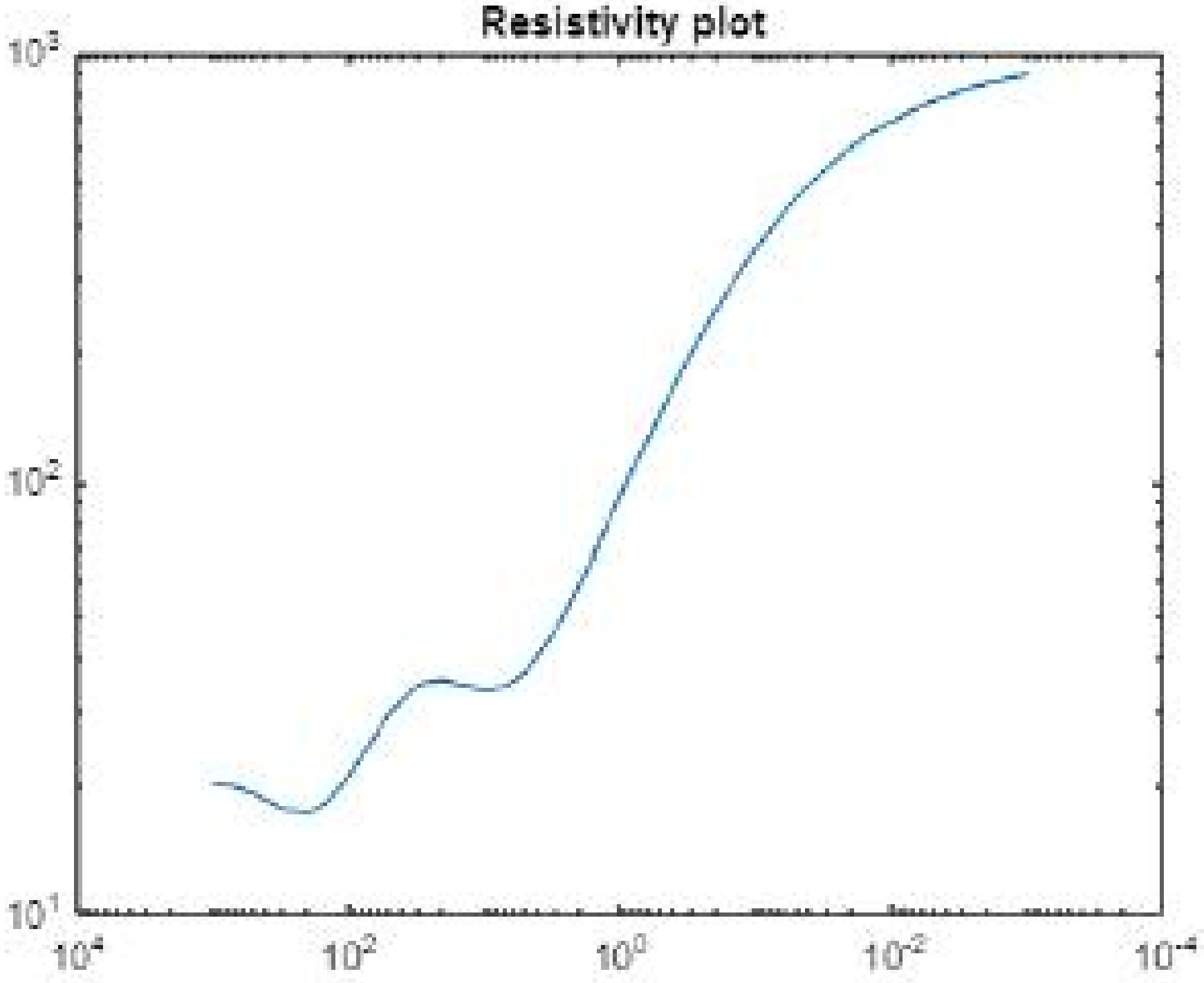


4 layer model
n=4,

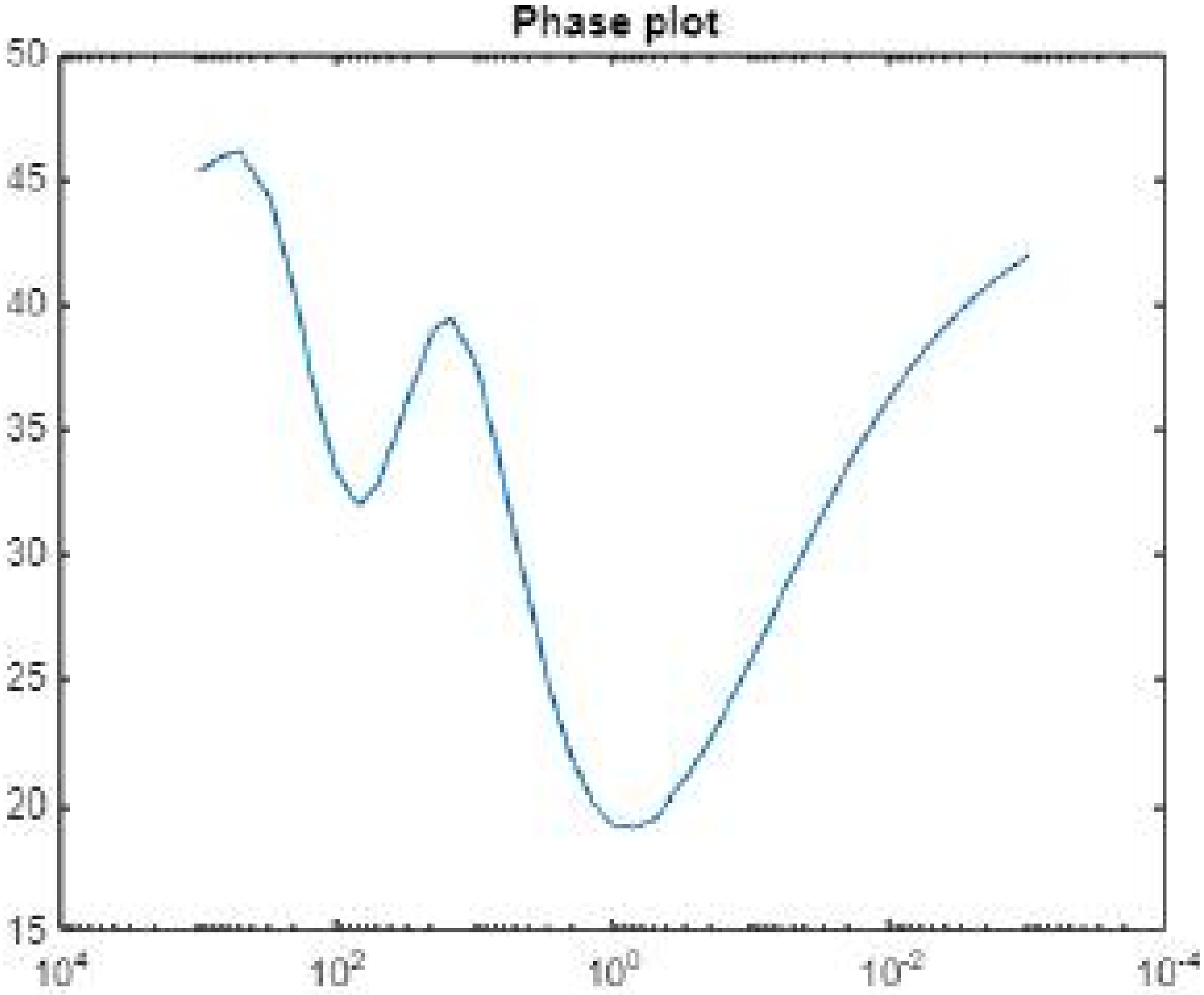
a) KH Type

Rho = [20 1000 10 1000] , h = [200 500 200]

Apparent resistivity vs Frequency Plot



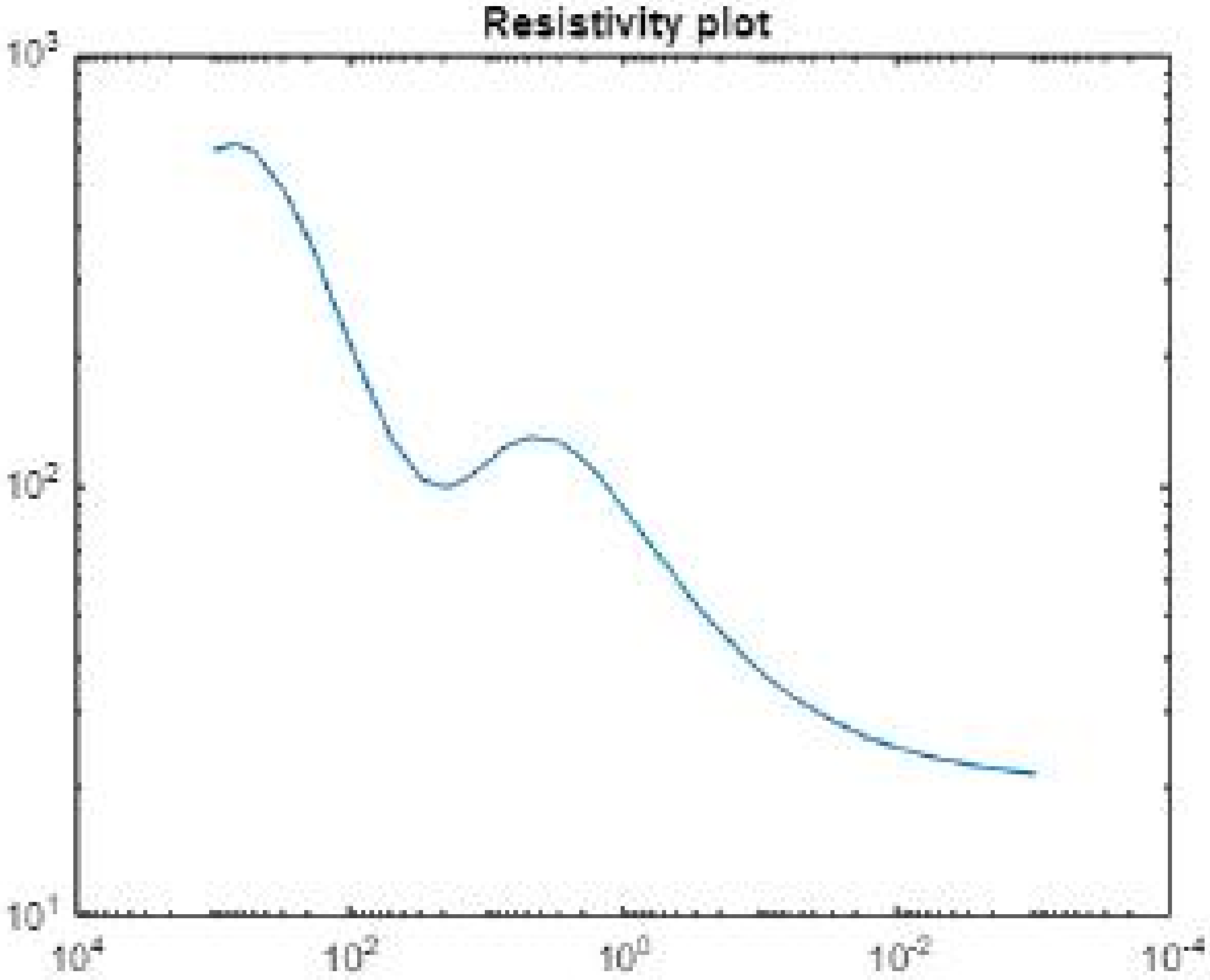
Phase vs Frequency Plot



a) HK Type

Rho = [500 10 500 20] , h = [500 100 2000]

Apparent resistivity vs Frequency Plot



Phase vs Frequency Plot