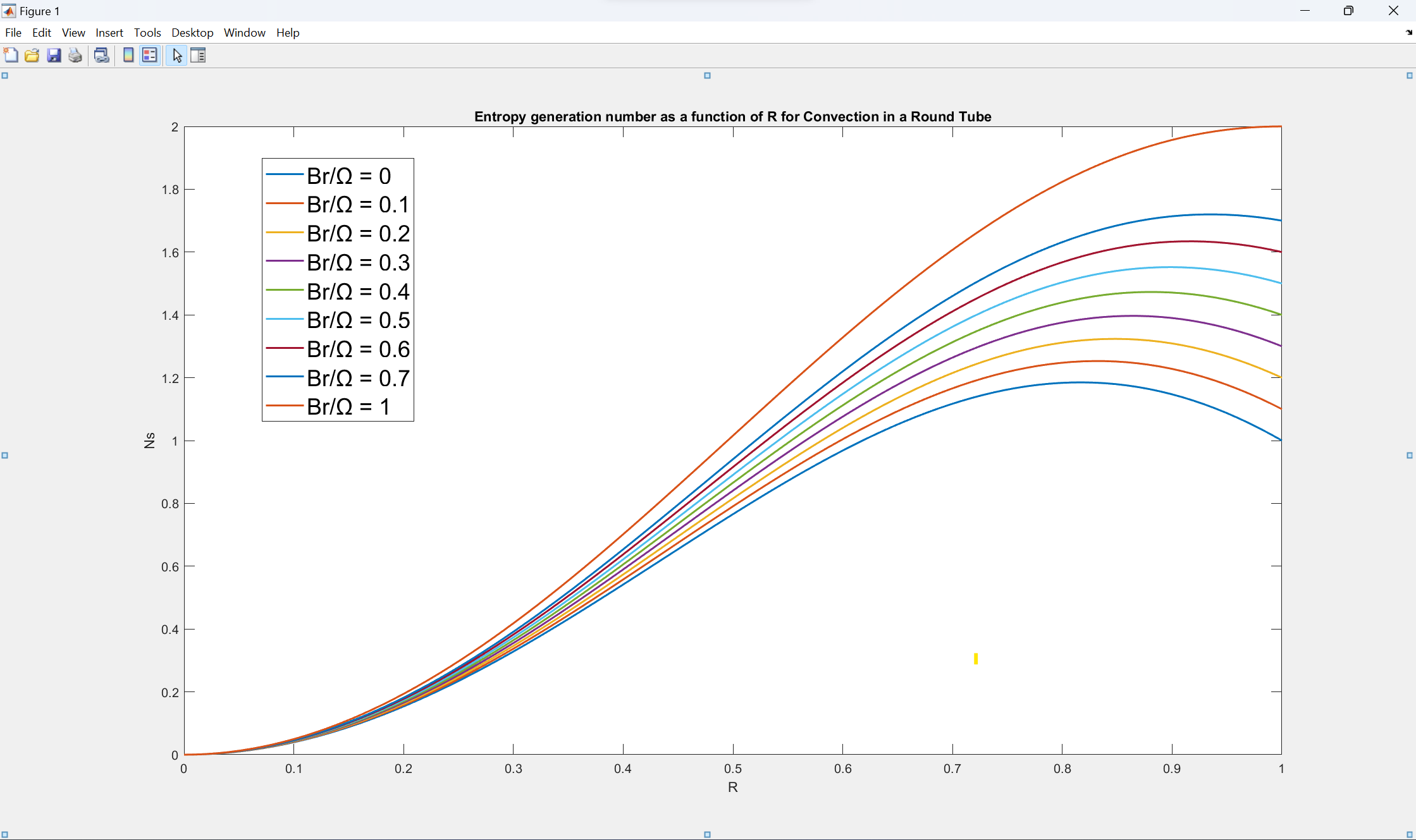
**MATLAB CODE**

R = linspace(0,1,100);

plot(R,(R.^3 - 2\*R).^2 + 0\*R.^2,LineWidth=1.5);

xlabel('R')

ylabel('Ns')

title(['Entropy generation number as a function of R for Convection in a Round Tube'])

hold on

plot(R,(R.^3 - 2\*R).^2 + 0.1\*R.^2,LineWidth=1.5);

plot(R,(R.^3 - 2\*R).^2 + 0.2\*R.^2,LineWidth=1.5);

plot(R,(R.^3 - 2\*R).^2 + 0.3\*R.^2,LineWidth=1.5);

plot(R,(R.^3 - 2\*R).^2 + 0.4\*R.^2,LineWidth=1.5);

plot(R,(R.^3 - 2\*R).^2 + 0.5\*R.^2,LineWidth=1.5);

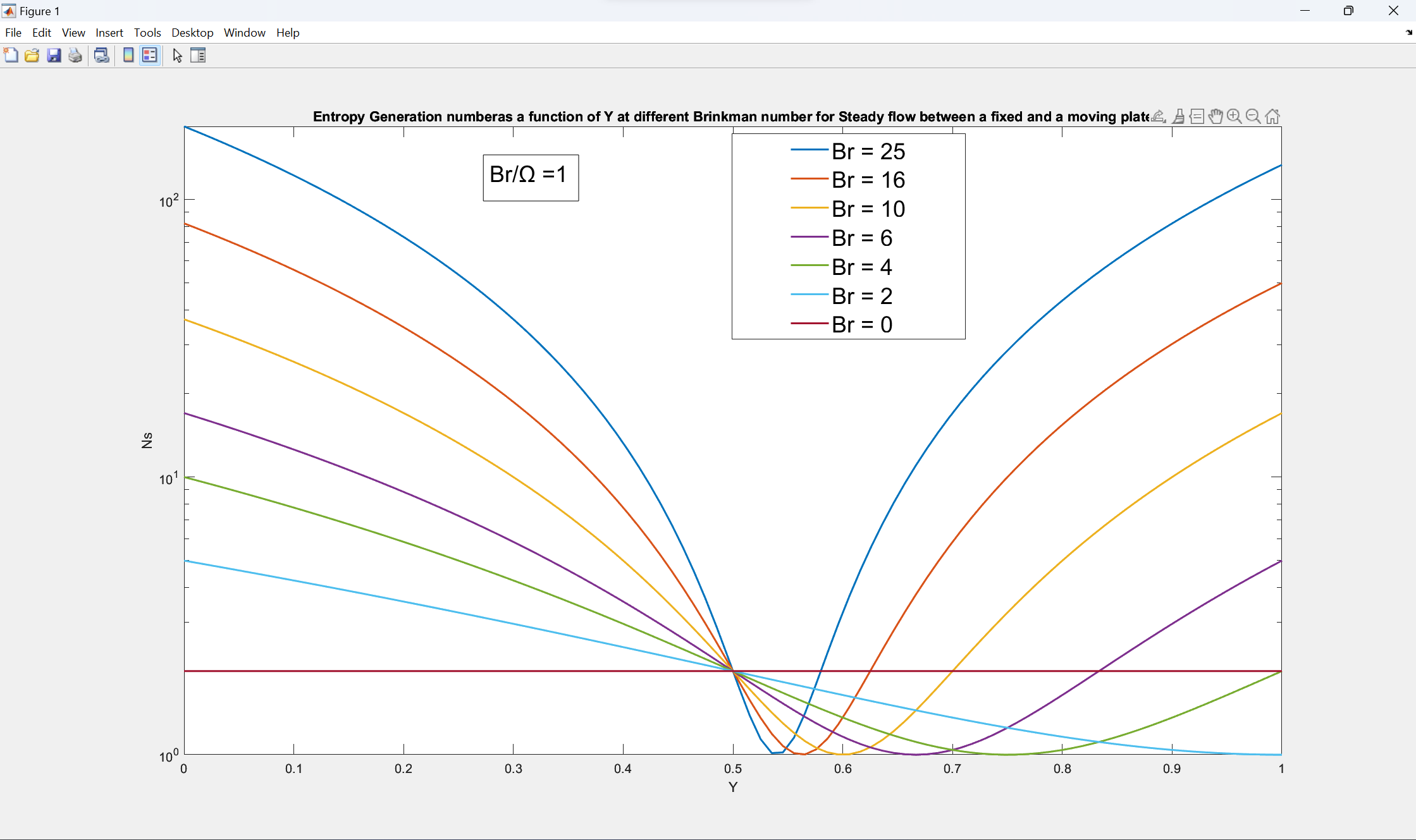
plot(R,(R.^3 - 2\*R).^2 + 0.6\*R.^2,LineWidth=1.5);

plot(R,(R.^3 - 2\*R).^2 + 0.7\*R.^2,LineWidth=1.5);

plot(R,(R.^3 - 2\*R).^2 + 01\*R.^2,LineWidth=1.5);

hold off

legend("Br/Ω = 0","Br/Ω = 0.1","Br/Ω = 0.2","Br/Ω = 0.3","Br/Ω = 0.4","Br/Ω = 0.5","Br/Ω = 0.6","Br/Ω = 0.7","Br/Ω = 1")

**MATLAB CODE**

Y = linspace(0,1,100);

semilogy(Y,(1+(25./2)-25\*Y).^2 +1,LineWidth=1.5)

xlabel('R')

ylabel('Ns')

title('Entropy Generation numberas a function of Y at different Brinkman number for Steady flow between a fixed and a moving plate')

hold on

plot(Y,(1+(16./2)-16\*Y).^2 +1,LineWidth=1.5)

plot(Y,(1+(10./2)-10\*Y).^2 +1,LineWidth=1.5)

plot(Y,(1+(6./2)-6\*Y).^2 +1,LineWidth=1.5)

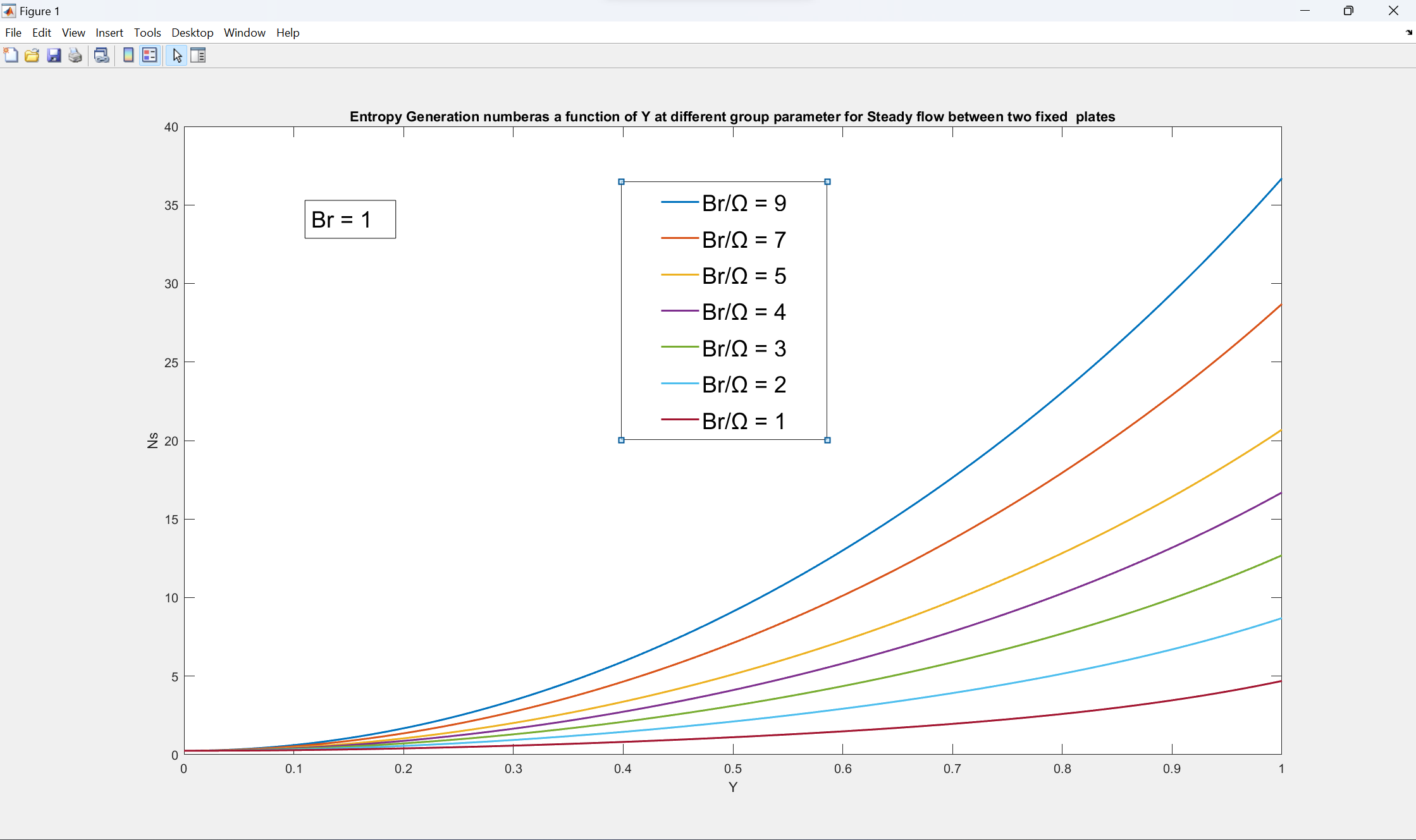
plot(Y,(1+(4./2)-4\*Y).^2 +1,LineWidth=1.5)

plot(Y,(1+(2./2)-2\*Y).^2 +1,LineWidth=1.5)

plot(Y,(1+(0./2)-0\*Y).^2 +1,LineWidth=1.5)

hold off

legend("Br = 25","Br = 16","Br = 10","Br = 6","Br = 4","Br = 2","Br = 0")

****

**MATLAB CODE**

Y = linspace(0,1,100);

plot(Y,(0.5-1.3333\*Y.^3).^2+4\*Y.^2\*9,LineWidth=1.5);

xlabel('Y')

ylabel('Ns')

title('Entropy Generation number as a function of Y at different group parameter for Steady flow between two fixed plates')

hold on

plot(Y,(0.5-1.3333\*Y.^3).^2+4\*Y.^2\*7,LineWidth=1.5);

plot(Y,(0.5-1.3333\*Y.^3).^2+4\*Y.^2\*5,LineWidth=1.5);

plot(Y,(0.5-1.3333\*Y.^3).^2+4\*Y.^2\*4,LineWidth=1.5);

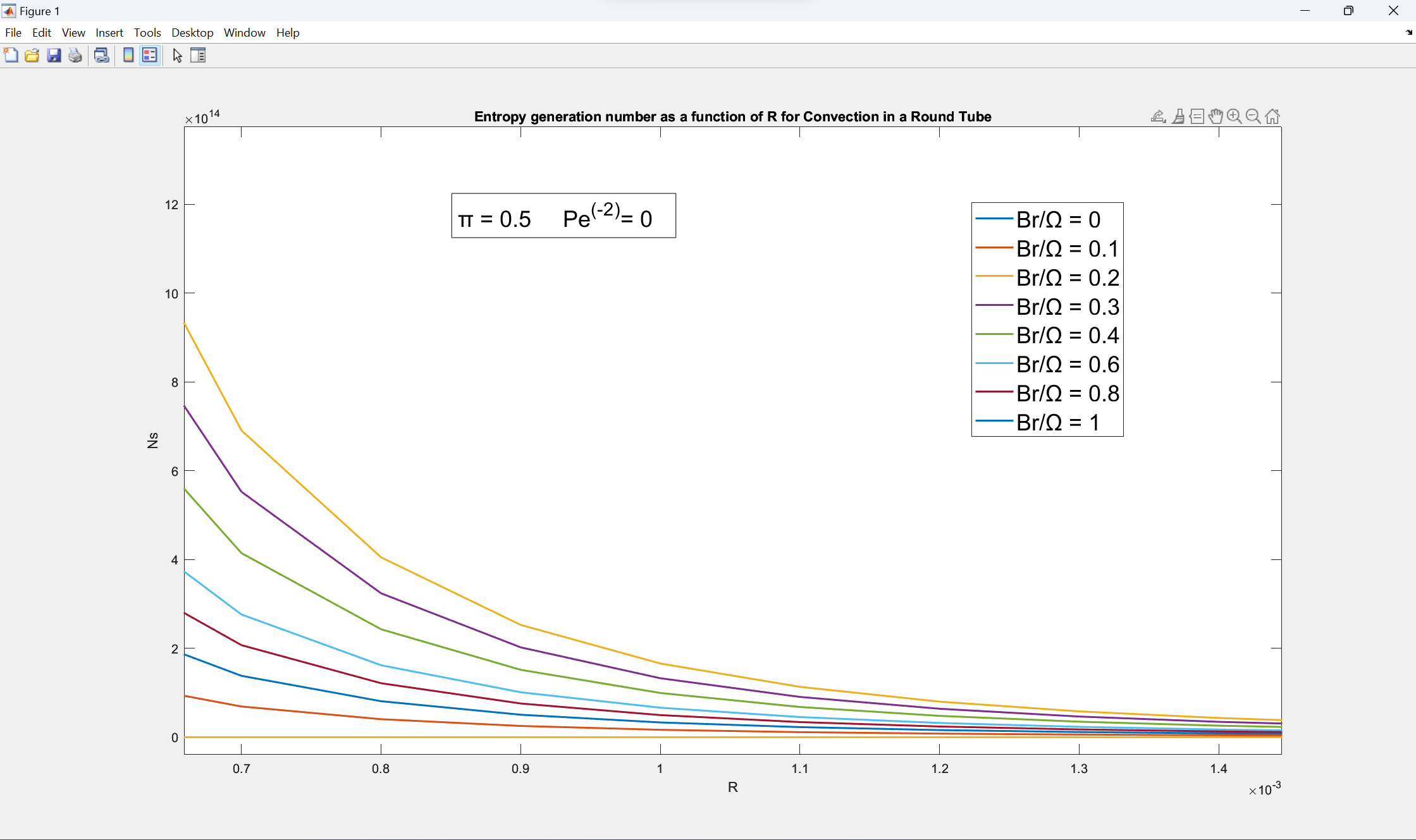
plot(Y,(0.5-1.3333\*Y.^3).^2+4\*Y.^2\*3,LineWidth=1.5);

plot(Y,(0.5-1.3333\*Y.^3).^2+4\*Y.^2\*2,LineWidth=1.5);

plot(Y,(0.5-1.3333\*Y.^3).^2+4\*Y.^2\*1,LineWidth=1.5);

hold off

legend("Br/Ω = 9","Br/Ω = 7","Br/Ω = 5","Br/Ω = 4","Br/Ω = 3","Br/Ω = 2","Br/Ω = 1")

****

**Matlab Code**

c1 =0.167978719;

c2 = 1.08202128;

R = linspace(0,1,10000);

plot(R,(((2\*R.\*(1+(c2\*log(R))-c2))/(c2-1) + (c2\*R-R.^3)/(c2-1))).^2 + 4\*1\*((2\*R-(c2./(R.^2))).^2)./(c1^2),LineWidth=1.5)

xlabel('R')

ylabel('Ns')

title(['Entropy generation number as a function of R for',' Convection in a Round Tube'])

hold on

plot(R,(((2\*R.\*(1+(c2\*log(R))-c2))/(c2-1) + (c2\*R-R.^3)/(c2-1))).^2 + 4\*0.8\*((2\*R-(c2./(R.^2))).^2)./(c1^2),LineWidth=1.5)

plot(R,(((2\*R.\*(1+(c2\*log(R))-c2))/(c2-1) + (c2\*R-R.^3)/(c2-1))).^2 + 4\*0.6\*((2\*R-(c2./(R.^2))).^2)./(c1^2),LineWidth=1.5)

plot(R,(((2\*R.\*(1+(c2\*log(R))-c2))/(c2-1) + (c2\*R-R.^3)/(c2-1))).^2 + 4\*0.4\*((2\*R-(c2./(R.^2))).^2)./(c1^2),LineWidth=1.5)

plot(R,(((2\*R.\*(1+(c2\*log(R))-c2))/(c2-1) + (c2\*R-R.^3)/(c2-1))).^2 + 4\*0.3\*((2\*R-(c2./(R.^2))).^2)./(c1^2),LineWidth=1.5)

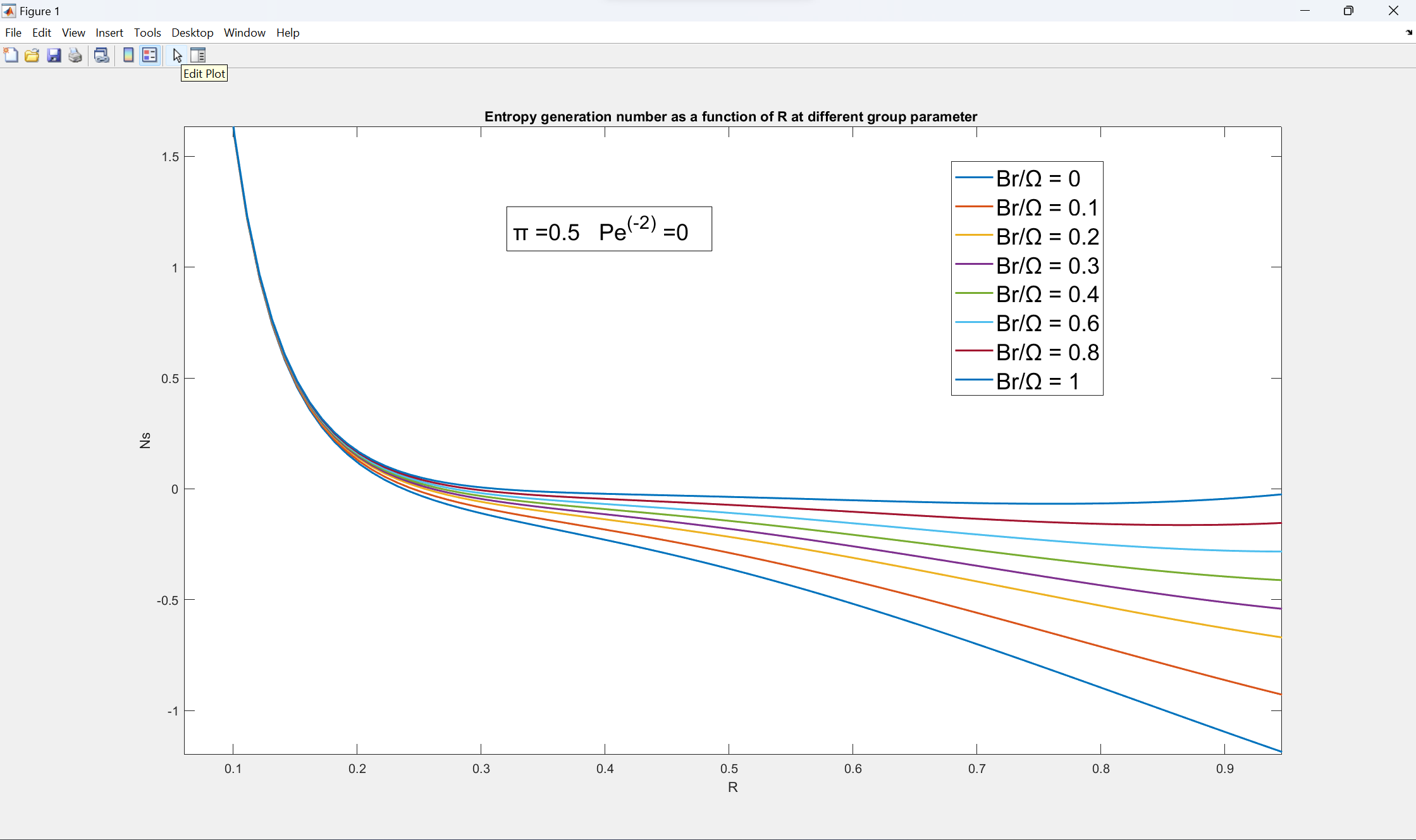
plot(R,(((2\*R.\*(1+(c2\*log(R))-c2))/(c2-1) + (c2\*R-R.^3)/(c2-1))).^2 + 4\*0.2\*((2\*R-(c2./(R.^2))).^2)./(c1^2),LineWidth=1.5)

plot(R,(((2\*R.\*(1+(c2\*log(R))-c2))/(c2-1) + (c2\*R-R.^3)/(c2-1))).^2 + 4\*0.1\*((2\*R-(c2./(R.^2))).^2)./(c1^2),LineWidth=1.5)

plot(R,(((2\*R.\*(1+(c2\*log(R))-c2))/(c2-1) + (c2\*R-R.^3)/(c2-1))).^2 + 4\*0\*((2\*R-(c2./(R.^2))).^2)./(c1^2),LineWidth=1.5)

hold off

legend("Br/Ω = 0","Br/Ω = 0.1","Br/Ω = 0.2","Br/Ω = 0.3","Br/Ω = 0.4","Br/Ω = 0.6","Br/Ω = 0.8","Br/Ω = 1")

**matlab code**

R = linspace(0,1,100);

plot(R,(0.25./R + R.\*(2\*log(R./0.5)-1)).^2./(0.25 - 2\*log(0.5)+1)+ 0.5\*1./((-0.3465736./R.^2)),LineWidth=1.5)

xlabel('R')

ylabel('Ns')

title('Entropy generation number as a function of R at different group parameter ')

hold on

plot(R,(0.25./R + R.\*(2\*log(R./0.5)-1)).^2./(0.25 - 2\*log(0.5)+1)+ 0.5\*0.8./((-0.3465736./R.^2)),LineWidth=1.5)

plot(R,(0.25./R + R.\*(2\*log(R./0.5)-1)).^2./(0.25 - 2\*log(0.5)+1)+ 0.5\*0.6./((-0.3465736./R.^2)),LineWidth=1.5)

plot(R,(0.25./R + R.\*(2\*log(R./0.5)-1)).^2./(0.25 - 2\*log(0.5)+1)+ 0.5\*0.5./((-0.3465736./R.^2)),LineWidth=1.5)

plot(R,(0.25./R + R.\*(2\*log(R./0.5)-1)).^2./(0.25 - 2\*log(0.5)+1)+ 0.5\*0.4./((-0.3465736./R.^2)),LineWidth=1.5)

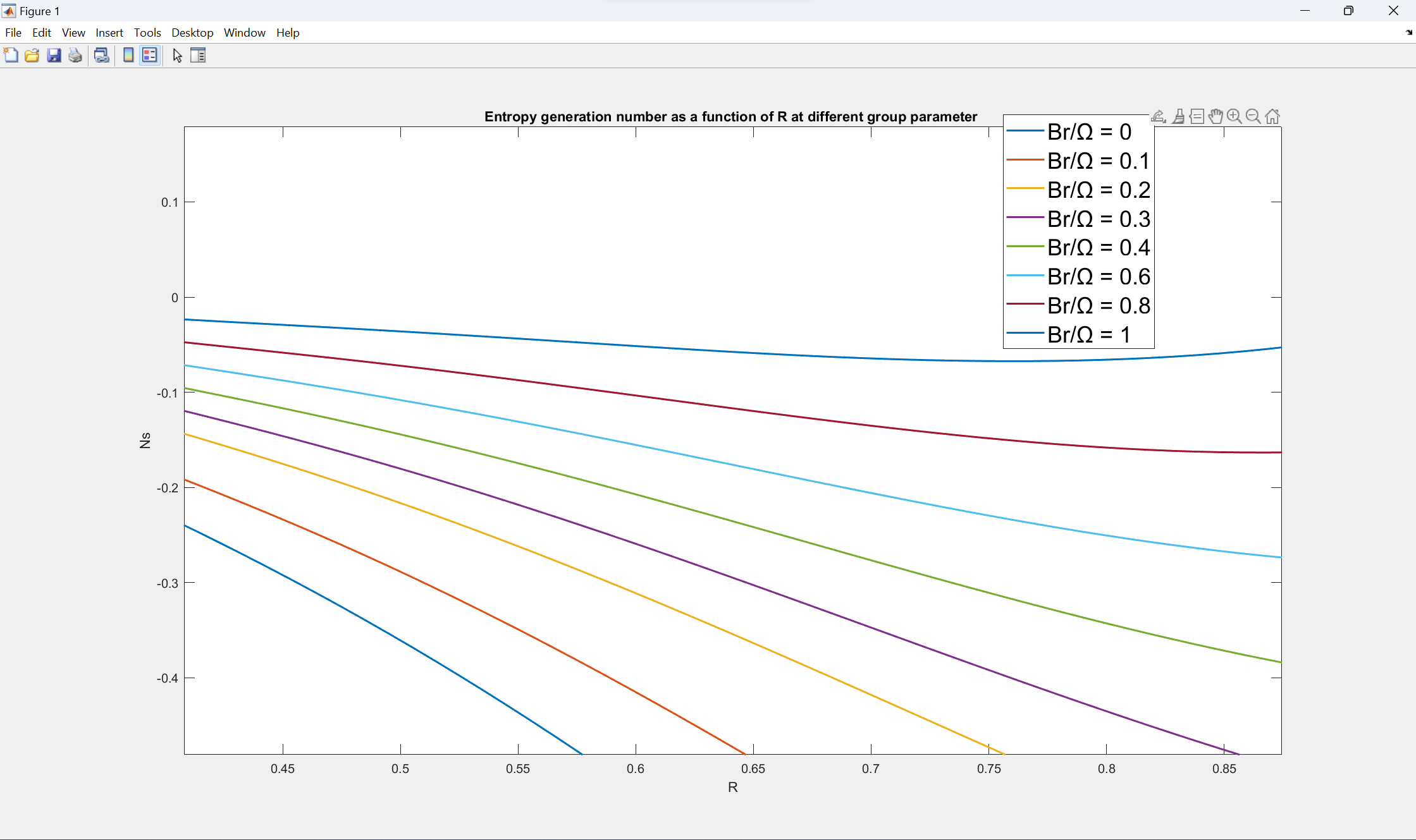
plot(R,(0.25./R + R.\*(2\*log(R./0.5)-1)).^2./(0.25 - 2\*log(0.5)+1)+ 0.5\*0.3./((-0.3465736./R.^2)),LineWidth=1.5)

plot(R,(0.25./R + R.\*(2\*log(R./0.5)-1)).^2./(0.25 - 2\*log(0.5)+1)+ 0.5\*0.2./((-0.3465736./R.^2)),LineWidth=1.5)

plot(R,(0.25./R + R.\*(2\*log(R./0.5)-1)).^2./(0.25 - 2\*log(0.5)+1)+ 0.5\*0.1./((-0.3465736./R.^2)),LineWidth=1.5)

hold off

legend("Br/Ω = 0","Br/Ω = 0.1","Br/Ω = 0.2","Br/Ω = 0.3","Br/Ω = 0.4","Br/Ω = 0.6","Br/Ω = 0.8","Br/Ω = 1")

**matlab code**

R = linspace(0,1,100);

plot(R,-0.4328085.\*log(R)./(R.^3) -0.865617\*(1-(0.25./R.^2)./R +1.4427./R+1\*0.00000016.\*R.^4),LineWidth=1.5)

xlabel('R')

ylabel('Ns')

title('Entropy generation number as a function of R at different group parameter ')

hold on

plot(R,-0.4328085.\*log(R)./(R.^3) -0.865617\*(1-(0.25./R.^2)./R +1.4427./R+0.8\*0.00000016.\*R.^4),LineWidth=1.5)

plot(R,-0.4328085.\*log(R)./(R.^3) -0.865617\*(1-(0.25./R.^2)./R +1.4427./R+0.6\*0.00000016.\*R.^4),LineWidth=1.5)

plot(R,-0.4328085.\*log(R)./(R.^3) -0.865617\*(1-(0.25./R.^2)./R +1.4427./R+0.5\*0.00000016.\*R.^4),LineWidth=1.5)

plot(R,-0.4328085.\*log(R)./(R.^3) -0.865617\*(1-(0.25./R.^2)./R +1.4427./R+0.4\*0.00000016.\*R.^4),LineWidth=1.5)

plot(R,-0.4328085.\*log(R)./(R.^3) -0.865617\*(1-(0.25./R.^2)./R +1.4427./R+0.2\*0.00000016.\*R.^4),LineWidth=1.5)

plot(R,-0.4328085.\*log(R)./(R.^3) -0.865617\*(1-(0.25./R.^2)./R +1.4427./R+0.1\*0.00000016.\*R.^4),LineWidth=1.5)

plot(R,-0.4328085.\*log(R)./(R.^3) -0.865617\*(1-(0.25./R.^2)./R +1.4427./R+0\*0.00000016.\*R.^4),LineWidth=1.5)