APPENDIX A
M-FILE USED FOR INITIAL SHUNT RESISTOR VALUES

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%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% plate.m  Last edited 4/2/99
%
% Wnd:open circuit frequency;
% Wne:short circuit frequency;
% We:electric resonant frequency
% K31=input('What is K31=');

Wnd=250.375
Wne=249.3125
K31=sqrt((Wnd^2-Wne^2)/Wne^2)
%(Generalized Electromechanical Coupling Constant
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disp('*** In resonant tuning case ***');
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% K3t=3800;                   %(Relative Dielectric Constant)
% epi=8.85E-12;
% Area=0.07239*0.07239;       %(Area of PZT)
% t=2.67E-4;                  %(PZT Thickness)
% Cpt=K3t*epi*Area/t
k31=0.44;
% Cps=Cpt*(1-k31^2)           %(Calculated PZT Capacitance)
Cps=410E-9                    %(Experimental PZT Capacitance)


deltaopt=sqrt(1+K31^2)        %(Optimal Tuning Ratio)
ropt=sqrt(2)*(K31/(1+K31^2))  %(Optimal Damping Ratio)
We=deltaopt*Wnd               %(Electrical Resonant Frequency)

inductor=1/(2*pi*We)^2/Cps    %(Calculated Inductor Value)

Res=ropt/(Cps*Wne*2*pi)
Opres=sqrt(inductor/(4*Cps))

freq=1/sqrt(inductor*Cps);
Hz=freq/(2*pi)                %(Tuning Frequency)



disp('*** Shunt Resistor Value ***');
r=sqrt(1-k31^2);
Res1=r/(Cps*Wne*2*pi) %(Shunt Resistor Value)


disp('*** Inductor Resistor Value ***');

R135=10E3
capacitor=10E-9;
Rstar=inductor/capacitor;
R2=R135^3/Rstar %(Inductor Resistor Value)
```