

In[45]:= F = 15 000.0;

Simplify[Solve[Sin[ $\frac{\pi}{2 F}$ ] ==  $\frac{1 - r^2}{2 r}$ , r]]

... Solve: Solve was unable to solve the system with inexact coefficients. The answer was obtained by solving a corresponding exact system and numerizing the result.

Out[46]= {{r → -1.0001}, {r → 0.999895}}

In[362]:= NPC = 2.85;

SPc = 4.16;

NPs = 0.048;

SPs = 0.110;

NPr = NPs / NPC

SPr = SPs / SPc

NPowerc = 0.717; (\*mW\*)

SPowerc = 0.433;

NPowers = NPowerc \* NPr

SPowers = SPowerc \* SPr

FindRoot[{ $\frac{\text{BesselJ}[1, x]}{\text{BesselJ}[0, x]} - \sqrt{\text{NPr}}$ }, {x, 0.2}]

FindRoot[{ $\frac{\text{BesselJ}[1, x]}{\text{BesselJ}[0, x]} - \sqrt{\text{SPr}}$ }, {x, 0.2}]

Out[366]= 0.0168421

Out[367]= 0.0264423

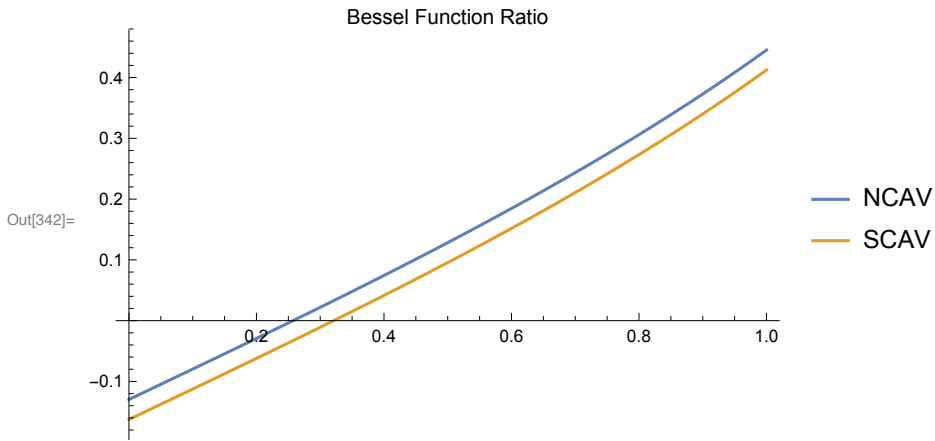
Out[370]= 0.0120758

Out[371]= 0.0114495

Out[372]= {x → 0.257399}

Out[373]= {x → 0.321014}

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In[342]:= Plot[{ $\frac{\text{BesselJ}[1, x]}{\text{BesselJ}[0, x]} - \sqrt{\text{NPr}}$ ,  $\frac{\text{BesselJ}[1, x]}{\text{BesselJ}[0, x]} - \sqrt{\text{SPr}}$ }, {x, 0, 1},
  PlotLegends -> {"NCAV", "SCAV"}, PlotLabel -> "Bessel Function Ratio"]
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In[378]:= NP0 = 1.102; (* Power incident on cavity in units of milliwatts*)
  SP0 = 0.887;
  NP0 - NPowerc - 2 * NPowers
  SP0 - SPowerc - 2 * SPowers
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Out[380]= 0.360848

Out[381]= 0.431101