In[•]:=
```
(*Define subscripted symbols*)
Notation`AutoLoadNotationPalette = False;
<< Notation`;
Symbolize /@ { D_e , r_e , r_0 , r_f };
```

Importing Data

Parameters

In[•]:=
```
(*Molecular Constants*)
molecule = "H2";
{D_e, r_e, μ, α} = {"D_e", "r_e", "mu", "alpha"} /. Normal[molecularData[molecule]];
μ = μ * 931.49410372 * 10^6; (*amu to eV/c^2*)
ħ = 1973.269804;

ℓ = 25;
r_0 = 0.01; r_f = 10;
gridPoints = 2000;
```

The Finite Difference Method

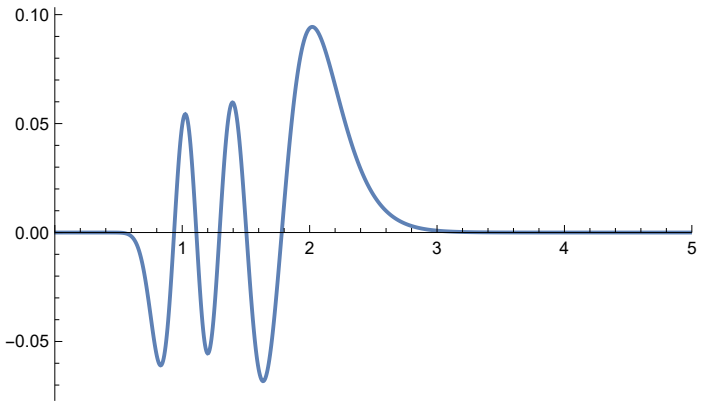
Eigenvalues and Eigenfunctions

In[•]:=
```
NumberForm[-#, {20, 8}] & /@ energyVals[[{1, 4, 6}]] // TableForm
```

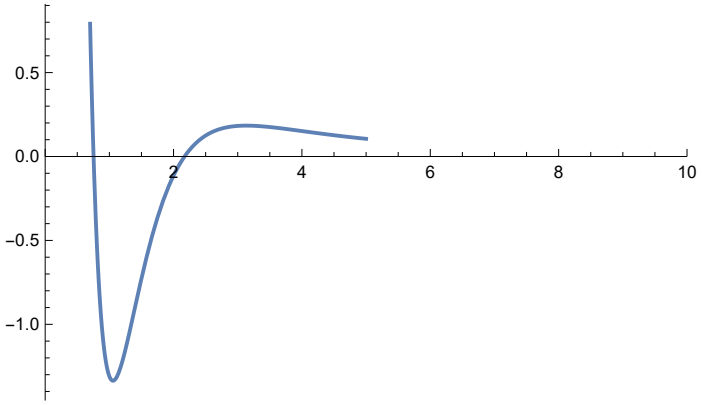
Out[•]//TableForm=
```
1.16592194
0.34028050
-0.01980385
```

In[•]:=
```
ListLinePlot[Thread[{rVals, eigenFunctions[[6]]}], PlotRange → {{0, 5}, Full}]
```

Out[•]=



In[•]:=
```
Plot[ModifiedMorse[r], {r, 0.7, 5}, PlotRange → {{0, 10}, Full}]
```




```
(*nufaPlot:=Plot[Evaluate[ψnf[r]],{r,0.9,1.4},
    PlotRange→Full,PlotStyle→{Red,Thickness[0.001],Dashed}]
  fdmPlot:=ListLinePlot[Thread[{rVals, 1/√step eigenFunctions[[n+1]]}],
    PlotRange→{{0.9,1.4},Full},PlotStyle→{Blue,Thickness[0.001],Dashed}]
  Show[Evaluate@{nufaPlot,fdmPlot}]*)
```