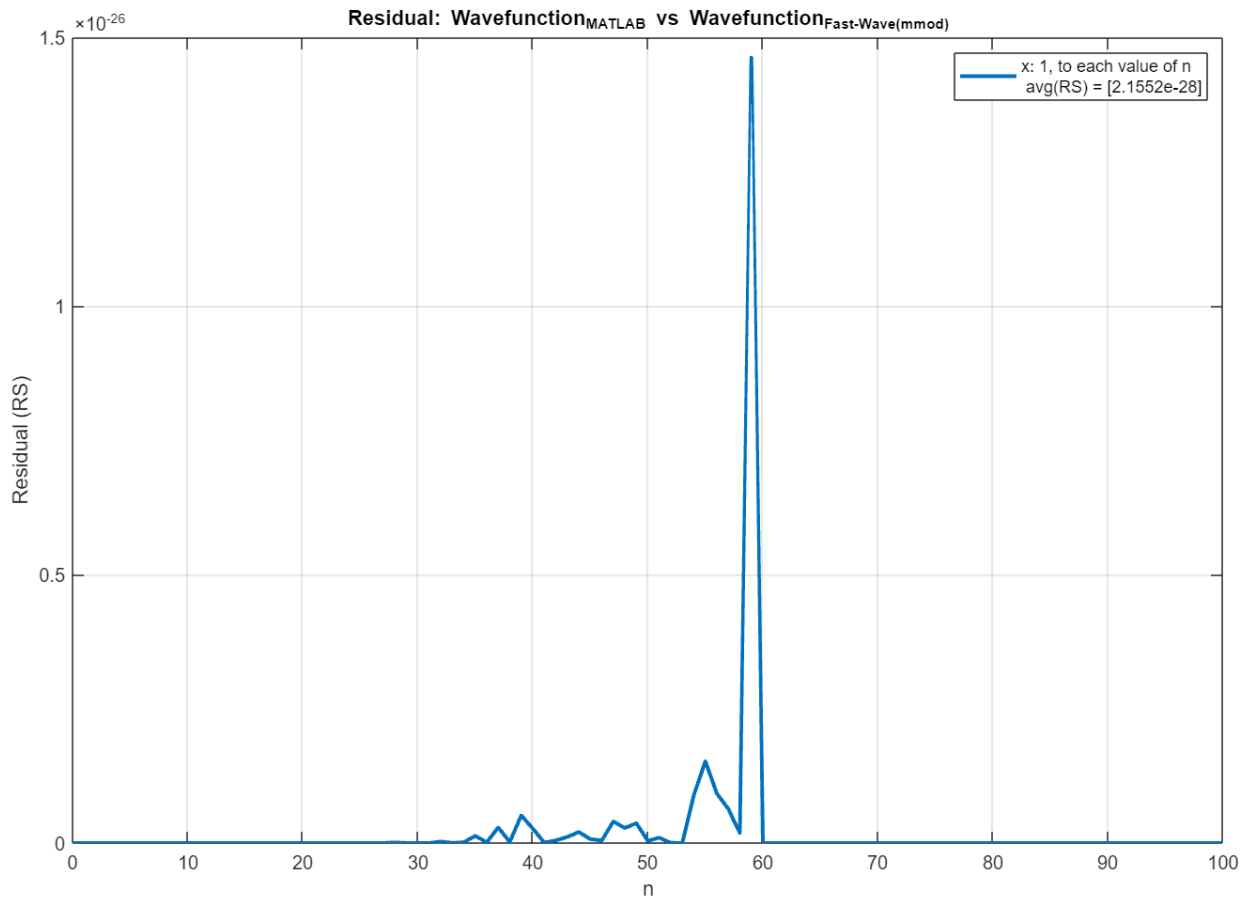## Global Variables

```
prec = 100;
digits(prec);
```

Precision Tests

Single-Mode Ondedimensional: x = 1.0

```
import py.fast_wave.wavefunction.wavefunction_smod

N_max = 100;
x = 1.0;

Residual = vpa(zeros(N_max+1, 1));
x_axi_plot = linspace(0,N_max,N_max+1);

for index = 1:N_max+1
    Residual(index,:) = (wavefunction_MATLAB_1(index, x, prec) -
vpa(wavefunction_smod(uint64(index), x)))^2;
end

figure('Position', [100, 100, 1200, 800]);
plot(x_axi_plot, Residual, 'LineWidth', 2);
grid on;

xlabel('n');
ylabel('Residual (RS)');
legend(sprintf('x: ' + string(x)+', to each value of n \n avg(RS) = ['+
string(double(mean(Residual)))+']'));
title('Residual: Wavefunction_{MATLAB} vs Wavefunction_{Fast-Wave(mmod)}');
```

Residual: Wavefunction$_{MATLAB}$ vs Wavefunction$_{Fast-Wave(mmod)}$

Single-Mode Ondedimensional: x = 50.0

```
import py.fast_wave.wavefunction.wavefunction_smod

N_max = 100;
x = 10.0;

Residual = vpa(zeros(N_max+1, 1));
x_axi_plot = linspace(0,N_max,N_max+1);

for index = 1:N_max+1
    Residual(index,:) = (wavefunction_MATLAB_1(index, x, prec) -
vpa(wavefunction_smod(uint64(index), x)))^2;
end

figure('Position', [100, 100, 1200, 800]);
plot(x_axi_plot, Residual, 'LineWidth', 2);
grid on;

xlabel('n');
```
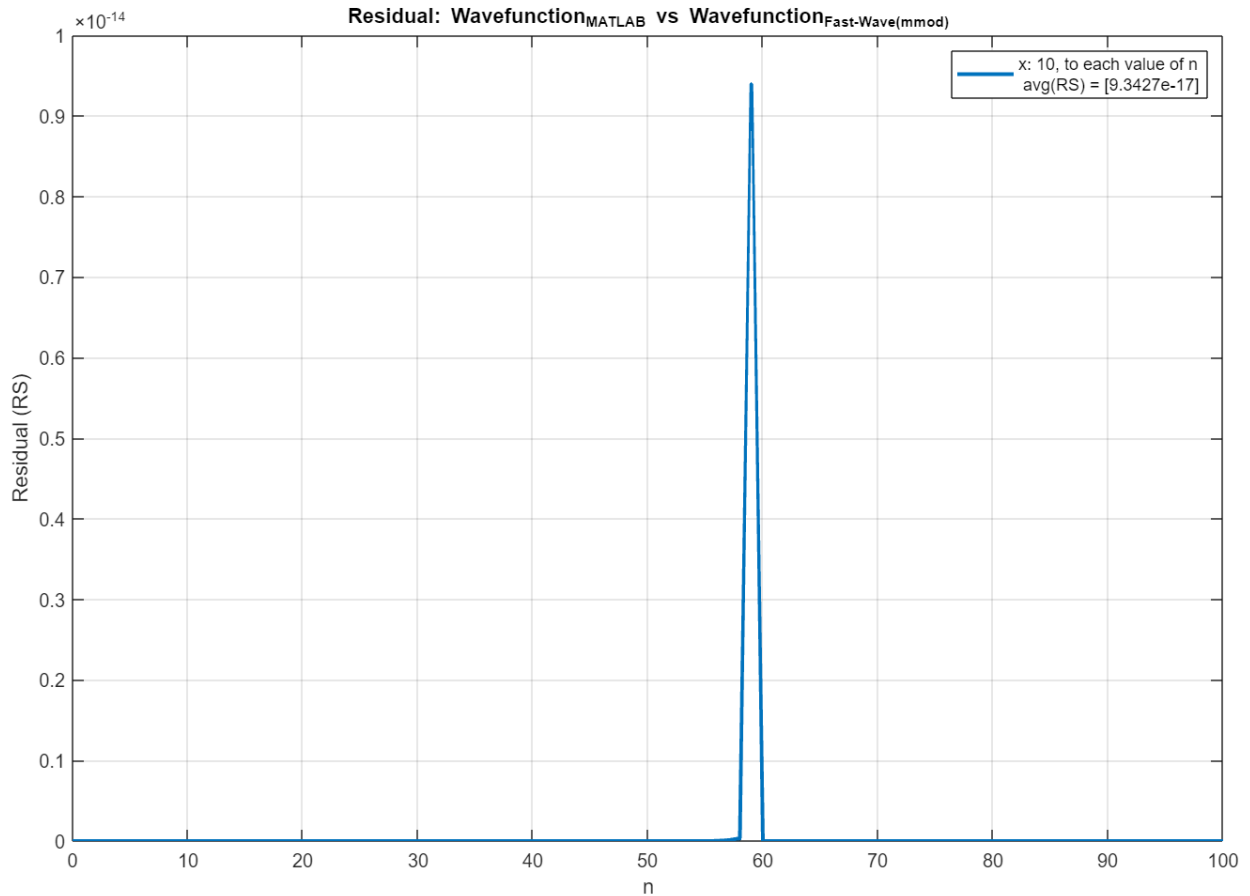
2

```matlab
ylabel('Residual (RS)');
legend(sprintf('x: ' + string(x)+', to each value of n \n avg(RS) = ['+
string(double(mean(Residual)))+']'));
title('Residual: Wavefunction_{MATLAB} vs Wavefunction_{Fast-Wave(mmod)}');
```


Residual: Wavefunction$_{MATLAB}$ vs Wavefunction$_{Fast-Wave(mmod)}$

Legend: x: 10, to each value of n avg(RS) = [9.3427e-17]

Single-Mode Ondedimensional: x = 20.0

```matlab
import py.fast_wave.wavefunction.wavefunction_smod

N_max = 100;
x = 20.0;

Residual = vpa(zeros(N_max+1, 1));
x_axi_plot = linspace(0,N_max,N_max+1);

for index = 1:N_max+1
    Residual(index,:) = (wavefunction_MATLAB_1(index, x, prec) -
vpa(wavefunction_smod(uint64(index), x)))^2;
end

figure('Position', [100, 100, 1200, 800]);
plot(x_axi_plot, Residual, 'LineWidth', 2);
```

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```
grid on;

xlabel('n');
ylabel('Residual (RS)');
legend(sprintf('x: ' + string(x)+', to each value of n \n avg(RS) = ['+
string(double(mean(Residual)))+']'));
title('Residual: Wavefunction_{MATLAB} vs Wavefunction_{Fast-Wave(mmod)}');
```