

# MATLAB highlighting in LaTeX documents

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## 1 MATLAB code demo

### Euler method

```
1 % Euler method for the ODE model
2 % u'(x)=x^2+x-u, x in [0,1]
3 % Initial condition: u(0)=0 ;
4 % Exact solution: u(x)=-exp(-x)+x^2-x+1.
5 clear all; clf
6 h=0.1;
7 x=0:h:1; % function interval
8 N=length(x)-1;
9 u(1)=0; % initial value
10 fun=@(t,u) t.^2+t-u; % RHS
11
12 for n=1:N
13     u(n+1)=u(n)+h.*fun(x(n),u(n));
14 end
15
16 ue=-exp(-x)+x.^2-x+1; % exact solution
17 plot(x,ue,'b-',x,u,'r+', 'LineWidth',1)
18 legend('Exact ', 'Numerical', 'location', 'North')
19 %title('Euler method', 'fontsize',12)
20 set(gca, 'fontsize',12)
21 xlabel('x', 'fontsize', 16), ylabel('u', 'fontsize',16, 'Rotation',0)
```

In this paper, we develop a spectral method for the Burgers' equation on the whole line base on modified Legendre rational function. The crucial point is to covert the Legendre polynomial to the modified Legendre rational functions by mapping. Based on the orthogonality of the modified Legendre rational function, we proposed related spectral schemes for the result equation and proved their stability and convergence. Numerical results demonstrate the efficiency of this approach.