$[-L,\, L]$

$u_t+\alpha(x,t)u_{xxxxt}+\beta u_{xx} = g_u(u)u_x, (x,t) \in [-L,\, L]\times(0,\, T],$

(1)

$\pm L, t) =$
$f_1(\pm L, t), t \in$
$(0,\, T],$
$u_x(\pm L, t) =$
$f_2(\pm L, t), t \in$
$(0,\, T].$
$(x, t) \in$
$\Omega\times$
$[0, T]$
α_0
β_0
$\alpha_0 <$
$\alpha(x, t) <$
β_0
g
$s+$
1
$s >$
0
??
??
$w =$
u_x
??
$_t+$
$\alpha(x,t)w_{xxxt}+$
$\beta w_x =$
$wg_u(u)$
w_t-
$u_{xt} =$
0
$u(\pm L, t) =$
$f_1(\pm L, t)$
$w(\pm L, t) =$
$f_2(\pm L, t)$
u
w
$N-$
$2\times$
$N-$
2
????
$u(x, t) =$
$\mathrm{sech}(x-$
$t)$
$g(u) =$
$10u^3-$
$12u^5-$
$\frac{3}{2}u$
$\beta =$
0
$\alpha(x, t) =$
1
$N =$
51
$[-1, 1]$
ode15s

```
    N = 51; L = 1; Tfinal = 30;
    phi = @(ep,r) 1./sqrt(1+(ep*r).^2); %Inverse MQ-RBF
    x = linspace(-1,1,N);
    linmap = @(x,x1,x2,y1,y2) (y2-y1)*(x-x1)/(x2-x1) + y1;
    % Map x to [-L,L] such that x(2) = -L, x(N-1) = L
    % and x(1), x(N) are left and right fictitious points respectively.
    x = linmap(x,x(2),x(N-1),-L,L); x = x(:); % RBF nodes
    ep = 0.1/min(diff(x)); % Shape parameter
```

**ode-
fun**

```
function U = odefun(t,u,x,N,D1d,D1bf,D4d,D4bf,Id)
    F = [sech(x([2 N-1]) - t); sech(x([2 N-1]) - t).*tanh(x([2 N-1]) - t)];
    Ft = [-sech(x([2 N-1]) - t).*tanh(x([2 N-1]) - t);...
end
```

$N-$
4
$N-$
4
$u =$
$[u_1 \cdots u_N]^T$
$x_1, \cdots, x_N$

```
    N = 51; L = 1; Tfinal = 30;
    phi = @(ep,r) 1./sqrt(1+(ep*r).^2); %Inverse MQ-RBF
    xc = linspace(-L,L,N).'; % RBF nodes
    ep = 0.1/min(diff(xc)); % Shape parameter
```

**dae-
fun**

```
function F = daefun(t,u)
   u_t = (-1.5 - 60*u.^4 + 30*u.^2).*(D*u);
   BC = [u(1)-sech(xc(1)-t);u(N)-sech(xc(N)-t);
```