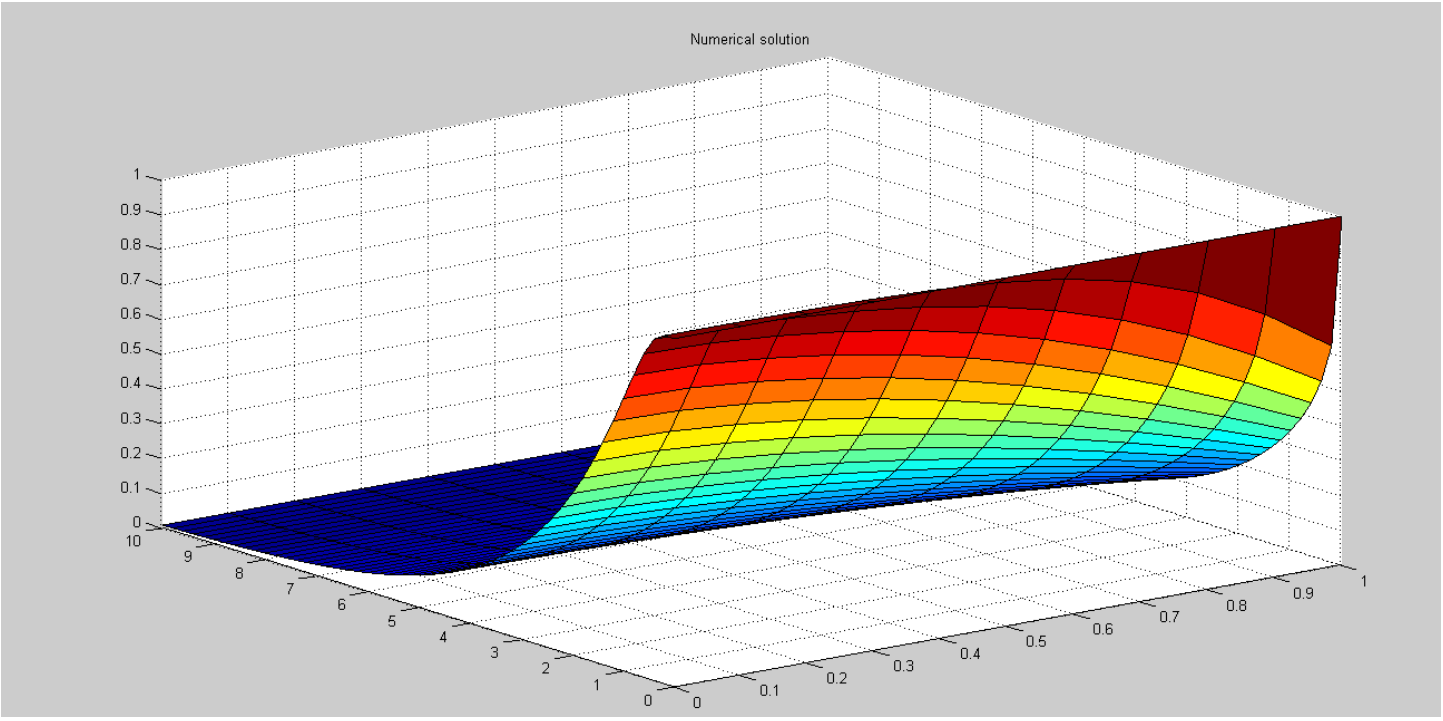
Solution:

MATLAB CODE:

```
function [pl,ql,pr,qr]= pdex1bc(xl,ul,xr,ur,t)

pl= 1;
ql= 0;
pr= 2.2333.*ur;
qr= 1;

function [c,f,s]= pdex1pde(x,t,u,DuDx)
c= 5;
f=DuDx;
s=0;

function uo= pdex1ic(x)% x= r and uo=To
uo= 1;  % initial temp of polymer strand at R= 0 and T=0

function pdex1
m=1;
xspan= [0:0.1:1]; %note x is dimensionless r (r/R).  r is varying from 0 to D/2= 0.0016 m
tspan= [0:2:10];% t= l/vo=5

sol= pdepe(m,@pdex1pde,@pdex1ic,@pdex1bc,xspan,tspan);

% extract the first solution component as u.
u= sol(:,:,1);

% A surface plot
surf(xspan,tspan,u)
title('Numerical solution')
xlabel('Distance x')
ylabel('Time t')

u % list all the values of u with xspan and tspan.
```



MATLAB Output:

Values of U with xspan and tspan

Column 1 to 11 represent xspan with step size of 0.1m where xmax=1 x is dimensionless r (r/R).
T is varying from 0 to 4 sec with step of 0.2 sec. Length of the bath is 1 meter. Velocity of polymer strand is assume to be around 0.25 m/sec.

u =

Columns 1 through 5

1.0000	1.0000	1.0000	1.0000	1.0000
0.9992	0.9989	0.9977	0.9948	0.9885
0.9801	0.9778	0.9690	0.9545	0.9317
0.9284	0.9244	0.9098	0.8874	0.8555
0.8580	0.8534	0.8365	0.8113	0.7767
0.7822	0.7775	0.7604	0.7352	0.7013
0.7080	0.7035	0.6872	0.6633	0.6314
0.6383	0.6341	0.6190	0.5970	0.5676
0.5741	0.5703	0.5566	0.5365	0.5098
0.5159	0.5124	0.5000	0.4818	0.4577
0.4633	0.4602	0.4489	0.4326	0.4109
0.4159	0.4131	0.4030	0.3883	0.3687
0.3733	0.3708	0.3617	0.3485	0.3309
0.3350	0.3328	0.3246	0.3127	0.2970
0.3007	0.2986	0.2913	0.2806	0.2665
0.2699	0.2680	0.2615	0.2519	0.2392
0.2422	0.2405	0.2346	0.2260	0.2147
0.2174	0.2159	0.2106	0.2029	0.1927
0.1951	0.1937	0.1890	0.1821	0.1729
0.1751	0.1739	0.1696	0.1634	0.1552
0.1571	0.1560	0.1522	0.1466	0.1392

Columns 6 through 10

1.0000	1.0000	1.0000	1.0000	1.0000
0.9756	0.9511	0.9086	0.8414	0.7446
0.8983	0.8516	0.7896	0.7112	0.6166
0.8133	0.7597	0.6945	0.6180	0.5314
0.7327	0.6790	0.6162	0.5450	0.4666
0.6588	0.6080	0.5496	0.4845	0.4139
0.5918	0.5449	0.4914	0.4324	0.3689
0.5313	0.4886	0.4402	0.3869	0.3299
0.4769	0.4383	0.3946	0.3467	0.2955
0.4280	0.3932	0.3539	0.3108	0.2649
0.3841	0.3528	0.3174	0.2788	0.2375
0.3447	0.3165	0.2848	0.2501	0.2131
0.3093	0.2840	0.2555	0.2244	0.1911
0.2776	0.2549	0.2293	0.2013	0.1715
0.2491	0.2287	0.2058	0.1807	0.1539
0.2236	0.2053	0.1847	0.1622	0.1382
0.2006	0.1842	0.1657	0.1455	0.1240
0.1801	0.1653	0.1487	0.1306	0.1113
0.1616	0.1484	0.1335	0.1172	0.0998
0.1450	0.1331	0.1198	0.1052	0.0896
0.1301	0.1195	0.1075	0.0944	0.0804