ME426: Applied Computational Methods in Mechanical Sciences

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# Assignment 1

PROBLEM STATEMENT:

The upward velocity of a rocket is given at three different times.

|  |  |
| --- | --- |
| Time ‘t’ ( in seconds ) | Velocity ‘v’ ( in m/s ) |
| 5 | 106.8 |
| 8 | 177.2 |
| 12 | 279.2 |

Velocity curve is approximated by a polynomial as :

Find the value of using gauss elimination method. Find the velocity at

Python Code:

import time

A = [[25,5,1],

[64,8,1],

[144,12,1]]

B = [106.8,177.2,279.2]

# Step 1: Gaussian elimination.

i=0

while i < 3:

# pivots

pivot = A[i][i]

j=i+1

while j<3:

r = A[j][i]/pivot

# row opreation

k=i

while k<3:

A[j][k] = A[j][k] - A[i][k]\*r

k=k+1

B[j]=B[j]-B[i]\*r

#print (A)

#print (B)

#print("\n")

j=j+1

i=i+1

#Step 2: Back Substitution from nth row

x= [0]\*3

n=3

i = n-1

x[i] = B[i]/A[i][i]

i=i-1

while i>=0:

sum = 0

k=i+1

while k<n:

#print("kth")

sum = sum + A[i][k]\*x[k]

k=k+1

x[i]=(B[i]-sum)/A[i][i]

i=i-1

#print("ith")

print ("\n Values of a,b,c are: ")

print (x)

print ("\n CPU time: ", time.process\_time(),'s')

print ("\n Velocity at t=6s:",x[0]\*6\*6+x[1]\*6+x[2],"m/s")

RESULTS:

Values of a,b,c are:

[0.2904761904761892, 19.690476190476197, 1.0857142857142739]

CPU time: 0.0625 s

Velocity at t=6s: 129.68571428571425 m/s