OLOMOWEWE RASHIDA OMOWUNMI

17/ENG04/057

ELECTRICAL ELECTRONICS ENGINEERING

ENGINEERING MATHEMATICS ASSIGNMENT

***Question 1 [20 Marks]***

 ***A flat plate of mass m falling freely in air with velocity V is subjected to a downward gravitational force and an upward frictional drag force due to air. If the drag force, FD, is given by Equation (1);***

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***and the terminal velocity is reached when the drag force equals the gravitational force, that is, FD = mg (2) taking the values of m and g to be 3.5 kg and 9.8 m/s2 respectively, using a guess value of 0.5 , 0 V = m s and employing fixed-point iteration method, develop a MATLAB program, without using “function” command, to estimate the terminal velocity. Take the absolute percentage relative error tolerance to be less than or equal to 1E-11.***

***SOLUTION:***

**MATLAB CODE:**

* commandwindow
* clear
* clc
* syms v
* syms m
* syms g
* m=3.5
* g=9.81
* v=0.5
* for i=1:30
* iter(i+1)=i;
* v(i+1)=sqrt((((3.5\*9.8)+(0.02\*(0.5)\*(i)))\*(500+(log(0.5\*i))^3))/0.3)
* Ea(i+1)=abs((v(i+1)-v(i))/v(i+1))\*100;
* if Ea(i+1)<=1E-11,break,end
* end
* v'
* iter'
* Ea'
* tablo=[iter' v' Ea']

**OUTPUT:**

**Table of value**

 **I v Ea**

 **0 0.5000 0**

 **1.0000 239.0507 99.7908**

 **2.0000 239.1652 0.0479**

 **3.0000 239.2160 0.0212**

 **4.0000 239.3145 0.0412**

 **5.0000 239.4537 0.0581**

 **6.0000 239.6216 0.0701**

 **7.0000 239.8095 0.0783**

 **8.0000 240.0111 0.0840**

 **9.0000 240.2222 0.0879**

 **10.0000 240.4399 0.0906**

 **11.0000 240.6621 0.0923**

 **12.0000 240.8872 0.0934**

 **13.0000 241.1141 0.0941**

 **14.0000 241.3418 0.0944**

 **15.0000 241.5699 0.0944**

 **16.0000 241.7978 0.0942**

 **17.0000 242.0251 0.0939**

 **18.0000 242.2516 0.0935**

 **19.0000 242.4771 0.0930**

 **20.0000 242.7013 0.0924**

 **21.0000 242.9242 0.0918**

 **22.0000 243.1457 0.0911**

 **23.0000 243.3657 0.0904**

 **24.0000 243.5842 0.0897**

 **25.0000 243.8010 0.0890**

 **26.0000 244.0163 0.0882**

 **27.0000 244.2300 0.0875**

 **28.0000 244.4421 0.0868**

 **29.0000 244.6526 0.0860**

 **30.0000 244.8615 0.0853**