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Application Of Differential Equations In Spherical Space

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Abstract

Application of differential equations in spherical space has been approved in this paper.

Regarding the importance of differential equations in mathematical mechanics , a reasonable relation is felt to be presented in order to design and optimize dynamic systems(dynamic mechanics) and all relevant subsets.

This paper tries to establish the relation in question in the simplest possible state.

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Introduction

In dynamic mechanics , the issue of movement relevant to a moving object is discussed and proved , and the dynamic mechanics subset is based on differential equations.

Applications

Regarding the method presented in mathematical , mechanics it can be used to apply differential equations in aerospace science , CNC machine , space ships central control , radars , etc.

Conclusion

In the presented method, it can be concluded that any kind of 1st order differential equations can be applied.

Reference

Elements of Partial Differential Equations, Ian N. Sneddon

The formula

$\left.\begin{array}{l}\frac{z}{x}=\tan\propto\\ \frac{z}{y}=\tan\boldsymbol{\beta}\tan\propto\\ \frac{y}{x}=\tan\boldsymbol{\gamma}\end{array}\right\}=\tan\beta\,.\,\tan\gamma$

$$dx/_{dt}=Vx\,dy/_{dt}=Vy\,dz/_{dt}=Vz$$

tan α = tan β. tan γ is relevant to differential equations images on 3 coordinates OXY, OXZ and OYZ.

N.B.: Extra details have been avoided. The trend of the formulas proof is descriptive enough.

Sincerely:

1-1 $y'+2.y=e^{-x}\Rightarrow {Vy}/{Vx}+2.y=e^{-x}$, $V=\sqrt{V^2_x+V^2_y},\ 0<V\leq 300{,}000$

1-2 $x^2.y'+3xy=\frac{Sin\,x}{x}\Rightarrow x^2.{Vy}/{Vx}+3xy=\frac{Sin\,x}{x}$, $V=\sqrt{V^2_x+V^2_y},\ 0<V\leq 300{,}000$

1-3 $y'+\frac{y}{x}=3\,Cos^2x\Rightarrow {Vy}/{Vx}+\frac{y}{x}=3Cos^2x$, , $V=\sqrt{V^2_x+V^2_y},0<V\leq 300{,}000$

1-4 $y'+y=xe^x\Rightarrow {Vy}/{Vx}+y=xe^x$, $V=\sqrt{V^2_x+V^2_y},\ 0<V\leq 300{,}000$

1-5 $y'+y.tan\,x=x.Sin^2x\Rightarrow {Vy}/{Vx}+y.tan\,x=x.Sin^2x$, $V=\sqrt{V^2_x+V^2_y},0<V\leq 300{,}000$

1-6 $y'+\frac{2xy}{1+x^2}=\frac{1}{1+x^2}\Rightarrow {Vy}/{Vx}+\frac{2xy}{1+x^2}=\frac{1}{1+x^2}$, $V=\sqrt{V^2_x+V^2_y},0<V\leq 300{,}000$

1-7 $y'+x^2y=1\Rightarrow {Vy}/{Vx}+x^2y=1\Rightarrow V=\sqrt{V^2_x+V^2_y},0<V\leq 300{,}000$

1-8 $y'+4y\,(tan^2x)=tan^2x\Rightarrow {Vy}/{Vx}+4y\,(tan^2x)=tan^2x\Rightarrow V=\sqrt{V^2_x+V^2_y},0<V\leq 300{,}000$

1-9 $xy'\,(\log_n x)=x\log_n(x-y)\Rightarrow x\frac{Vx}{Vy}\,(\log_n x)=x\log_n(x-y)\quad\Rightarrow V=\sqrt{V^2_x+V^2_y},0<V\leq 300{,}000$

1-10 $y'=(-Cos\,x)y+6\,Cos^2x\Rightarrow {Vy}/{Vx}=(-Cos\,x)y+6\,Cos^2x\Rightarrow$

$V=\sqrt{V^2_x+V^2_y},0<V\leq 300{,}000$

1-11 $y(zx^2y^3+3)dx+x(x^2y^3-1)dy=0\Rightarrow y(zx^2y^3+3)\frac{dx}{dt}+x(x^2y^3-1)\frac{dy}{dt}=0\Rightarrow y(zx^2y^3+3)Vx+x(x^2y^3-1)$

$Vy=0\Rightarrow V=\sqrt{V^2_x+V^2_y},0<V\leq 300{,}000$

1-12 $(y^2+yx^2)dx+(x^3-3xy)dy=0\Rightarrow(y^2+yx^2)\frac{dx}{dt}+(x^3-3xy)\frac{dy}{dt}=0\Rightarrow(y^2+yx^2)Vx+(x^3-3xy)Vy=0\Rightarrow V=\sqrt{V^2_x+V^2_y},0<V\leq 300{,}000$

1-13 $Y(2-3xy)dx-xdy=0\Rightarrow y(2-3xy)\frac{dx}{dt}-x\frac{dy}{dt}=0\Rightarrow y(2-3xy)Vx-xVy=0\Rightarrow V=\sqrt{V^2_x+V^2_y},\ 0<V\leq 300{,}000$

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1-14 $(4xy+3y^4)dx+(2x^2+5xy^3)dy=0 \Rightarrow (4xy+3y^4)\frac{dx}{dt}+(2x^2+5xy^3)\frac{dy}{dt}=0 \Rightarrow (4xy+3y^4)Vx+(2x^2+5xy^3)Vy=0 \Rightarrow V=\sqrt{V^2_x+V^2_y}$, $0 < V \leq 300{,}000$

1-15 $Y(x^4y-1)dx+x(xy^4-1)dy=0 \Rightarrow y(x^4y-1)\frac{dx}{dt}+x(xy^4-1)\frac{dy}{dt}=0 \Rightarrow y(x^4y-1)Vx+x(xy^4-1)Vy=0 \Rightarrow V=\sqrt{V^2_x+V^2_y}$, $0 < V \leq 300{,}000$

1-16 $(y^2+2xy+y)dx-(2xy+x^2-x)dy=0 \Rightarrow (y^2+2xy+y)\frac{dx}{dt}-(2xy+x^2-x)\frac{dy}{dt}=0 \Rightarrow (y^2+2xy+y)Vx-(2xy+x^2-x)Vy=0 \Rightarrow V=\sqrt{V^2_x+V^2_y}, 0 < V \leq 300{,}000$

1-17 $(2x^2y+y^2)dx+(2x^3-xy)dy=0 \Rightarrow (2x^2y+y^2)\frac{dx}{dt}+(2x^3-xy)\frac{dy}{dt}=0 \Rightarrow (2x^2y+y^2)Vx+(2x^3-xy)Vy=0 \Rightarrow$

$V=\sqrt{V^2_x+V^2_y}$, $0 < V \leq 300{,}000$

1-18 $y(4x+3y^2)dx+x(2x+4y^2)dy=0 \Rightarrow y(4x+3y^2)\frac{dx}{dt}+x(2x+4y^2)\frac{dy}{dt}=0 \Rightarrow y(4x+3y^2)Vx+x(2x+4y^2)Vy=0 \Rightarrow V=\sqrt{V^2_x+V^2_y}$, $0 < V \leq 300{,}000$

1-19 $\frac{dy}{dx}=\frac{-y(\tan x+\log_n y)}{\tan x} \Rightarrow \frac{dy/dt}{dx/dt}=\frac{-y(\tan x+\log_n y)}{\tan x} \Rightarrow \frac{Vy}{Vx}=\frac{-y(\tan x+\log_n y)}{\tan x} \Rightarrow V=\sqrt{V^2_x+V^2_y}, 0 < V \leq 300{,}000$

1-20 $\frac{dy}{dx}=\frac{(zy+3xy^2)}{3x+4yx^2} \Rightarrow \frac{dy/dt}{dx/dt}=-\frac{zy+3xy^2}{3x+4yx^2} \Rightarrow \frac{Vy}{Vx}=\frac{2y+3xy^2}{3x+4yx^2} \Rightarrow V=\sqrt{V^2_x+V^2_y}, 0 < V \leq 300{,}000$

2-1 $Y \cdot dx + X \cdot dy + 2 \cdot Z \cdot dz = 0 \Rightarrow$

$Y \cdot \frac{dx}{dt} + X \cdot \frac{dy}{dt} + 2 \cdot Z \cdot \frac{dz}{dt} = 0$

$Y \cdot Vx + X \cdot Vy + 2 \cdot Z \cdot Vz = 0$

$V_T = \sqrt{V^2x + V^2y + V^2z}$

$0 < V_T \leq 300{,}000$ Km/Sec

2-1 $Z \cdot (z + y)\, dx + z \cdot (z+x)\, dy - 2 \cdot X \cdot dz = 0$

$Z \cdot (z + y)\frac{dx}{dt} + Z \cdot (z + x)\frac{dy}{dt} - 2 \cdot X \cdot \frac{dz}{dt} = 0$

$Z \cdot (z + y) \cdot Vx + Z \cdot (z + x) \cdot Vy - 2 \cdot X \cdot Vz = 0$

$V_T = \sqrt{V^2x + V^2y + V^2z}$

$0 < V_T \leq 300{,}000$ Km/Sec

2-2 $Y \cdot Z \cdot dx + 2 \cdot X \cdot Z \cdot dy - 3 \cdot X \cdot Y \cdot dz = 0$

$Y \cdot Z \cdot \frac{dx}{dt} + 2 \cdot X \cdot Z \cdot \frac{dy}{dt} - 3 \cdot X \cdot Y \cdot \frac{dz}{dt} = 0$

$Y \cdot Z \cdot Vx + 2 \cdot X \cdot Z \cdot Vy - 3 \cdot X \cdot Y \cdot Vz = 0$

$V_T = \sqrt{V^2x + V^2y + V^2z}$

$0 < V_T \leq 300{,}000$ Km/Sec

2-3 $2 \cdot X \cdot Z \cdot dx + Z \cdot dy - dz = 0$

$2 \cdot X \cdot Z \frac{dx}{dt} + Z \cdot \frac{dy}{dt} - \frac{dz}{dt} = 0$

$2 \cdot X \cdot Z \cdot Vx + Z \cdot Vy - Vz = 0$

$V_T = \sqrt{V^2x + V^2y + V^2z}$

$0 < V_T \leq 300{,}000$ Km/Sec

2-4 $(Y^2+X \cdot Z) \cdot dx + (X^2+Y \cdot Z) \cdot dy + 3 \cdot Z^2 \cdot dz = 0$

$(Y^2+X \cdot Z) \cdot \frac{dx}{dt} + (X^2+Y \cdot Z) \cdot \frac{dy}{dt} + 3 \cdot Z^2 \cdot \frac{dz}{dt} = 0$

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$(Y^2+X.Z).Vx+ (X^2+Y.Z). Vy + 3.Z^2 . Vz = 0$

$V_T = \sqrt{V^2x + V^2y + V^2z}$

$0 < V_T \leq 300{,}000$ Km/Sec

2-5 $(X^2.Z-Y^3). dx +3.X.Y^2. dy +X^3.dz = 0$

$(X^2.Z-Y^3).{}^{dx}/_{dt}+3.X.Y^2. {}^{dy}/_{dt}+X^3{}^{dz}/_{dt}=0$

$(X^2.Z-Y^3).Vx+ 3.X.Y^2. Vy + X^3. Vz = 0$

$V_T = \sqrt{V^2x + V^2y + V^2z}$

$0 < V_T \leq 300{,}000$ Km/Sec

2-6 $a^2.y^2.z^2. dx + b^2.z^2.x^2. dy+ c^2.x^2.y^2.dz = 0$

$a^2.y^2.z^2.{}^{dx}/_{dt} + b^2.z^2.x^2.{}^{dy}/_{dt} + c^2.x^2.y^2. {}^{dz}/_{dt} = 0$

$a^2.y^2.z^2.Vx+ b^2.z^2.x^2. Vy + c^2.x^2.y^2. Vz = 0$

$V_T = \sqrt{V^2x + V^2y + V^2z}$

$0 < V_T \leq 300{,}000$ Km/Sec

2-7 $X(y^2-a^2). dx+Y(x^2- z^2).dy–z(y^2 –a^2).dz= 0$

$X(y^2-a^2). {}^{dx}/_{dt} + Y(x^2- z^2). {}^{dy}/_{dt} - z(y^2 –a^2) {}^{dz}/_{dt} = 0$

$X(y^2-a^2).Vx+ Y(x^2- z^2). Vy - z(y^2 –a^2).Vz = 0$

$V_T = \sqrt{V^2x + V^2y + V^2z}$

$0 < V_T \leq 300{,}000$ Km/Sec

2-8 $Y.Z(y + z). dx + X.Z. (x + z). dy + X.Y(x + y). dz = 0$

$Y.Z(y + z). {}^{dx}/_{dt} + X.Z. (x + z). {}^{dy}/_{dt} + X.Y(x + y). {}^{dz}/_{dt} = 0$

$Y.Z(y + z). Vx+ X.Z. (x + z). Vy + X.Y(x + y). Vz = 0$

$V_T = \sqrt{V^2x + V^2y + V^2z}$

$0 < V_T \leq 300{,}000$ Km/Sec

2-9 $Z(z + y^2). dx + Z(z + x^2).dy – X.Y.(x + y).dz = 0$

$Z(z + y^2). {}^{dx}/_{dt} + Z(z + x^2). {}^{dy}/_{dt} - X.Y.(x + y). {}^{dz}/_{dt} = 0$

$Z(z +y^2). Vx+ Z(z + x^2).Vy - X.Y.(x + y). Vz = 0$

$V_T = \sqrt{V^2x + V^2y + V^2z}$

$0 < V_T \leq 300{,}000$ Km/Sec

2-10 $(y + z). dx + (z + x). dy + (x + y). dz =0$

$(y + z). {}^{dx}/_{dt}+(z+x). {}^{dy}/_{dt} +(x + y). {}^{dz}/_{dt} = 0$

$(y + z). Vx+ (z + x). Vy + (x + y). Vz = 0$

$V_T = \sqrt{V^2x + V^2y + V^2z}$

$0 < V_T \leq 300{,}000$ Km/Sec

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2-11 $Z.Y(a- x).dx +[z-y^2 + (a-x)^2].dy -Y.dz =0$

$Z.Y(a - x).\frac{dx}{dt} +[z-y^2 + (a - x)^2].\frac{dy}{dt} - Y.\frac{dz}{dt} = 0$

$Z.Y(a-x). Vx +[z-y^2 + (a - x)^2].Vy - Y.Vz =0$

$V_T = \sqrt{V^2x + V^2y + V^2z}$

$0 < V_T \leq 300{,}000$ Km/Sec

2-12 $Y.(1+z^2). dx + X.(1+z^2).dy+(x^2+y^2).dz =0$

$Y.(1 + z^2).\frac{dx}{dt} + X.(1 + z^2).\frac{dy}{dt} + (x^2 + y^2).\frac{dz}{dt} = 0$

$Y.(1 + z^2).Vx+ X.(1 + z^2). Vy +(x^2 + y^2).Vz=0$

$V_T = \sqrt{V^2x + V^2y + V^2z}$

$0 < V_T \leq 300{,}000$ Km/Sec

2-13 $(y2 + y.z + z^2). dx +(z^2 + z.x + x^2).dy + (x^2 + x.y + y^2).dz = 0$

$(y2 + y.z + z^2).\frac{dx}{dt} + (z^2 + z.x + x^2).\frac{dy}{dt} + (x^2 + x.y + y^2).\frac{dz}{dt} = 0$

$(y2 + y.z + z^2).Vx + (z^2 + z.x + x^2).Vy + (x^2 + x.y + y^2). Vz = 0$

$V_T = \sqrt{V^2x + V^2y + V^2z}$

$0 < V_T \leq 300{,}000$ Km/Sec

2-14 $Y.Z. dx + X.Z. dy + X.Y. dz = 0$

$Y.Z.\frac{dx}{dt} + X.Z.\frac{dy}{dt} + X.Y.\frac{dz}{dt} = 0$

$Y.Z. Vx+ X.Z. Vy + X.Y. Vz = 0$

$V_T = \sqrt{V^2x + V^2y + V^2z}$

$0 < V_T \leq 300{,}000$ Km/Sec

2-15 $(1+y+z). dx+X.(z- x).dy -(1+ x.y).dz=0$

$(1+y+z).\frac{dx}{dt} +X.(z-x).\frac{dy}{dt} -(1+x.y).\frac{dz}{dt}=0$

$(1+y+ z).Vx + X.(z - x)..Vy - (1+ x.y).Vz =0$

$V_T = \sqrt{V^2x + V^2y + V^2z}$

$0 < V_T \leq 300{,}000$ Km/Sec

2-16 $Y.(x + 4).(y + z).dx - X.(y + 3.z). dy + 2.X.Y. dz = 0$

$Y.(x + 4).(y + z).\frac{dx}{dt} - X.(y + 3.z).\frac{dy}{dt} + 2.X.Y.\frac{dz}{dt} = 0$

$Y.(x + 4).(y + z). Vx- X.(y + 3.z). Vy + 2.X.Y. Vz = 0$

$V_T = \sqrt{V^2x + V^2y + V^2z}$

$0 < V_T \leq 300{,}000$ Km/Sec

2-17 $Y.Z.dx+(x^2 -y- z.x).dy+(x^2.z-x.y).dz = 0$

$Y.Z.\frac{dx}{dt} + (x^2. - y- z.x).\frac{dy}{dt} + (x^2.z- x.y).\frac{dz}{dt} = 0$

$Y.Z..Vx + (x^2. - y- z.x).Vy +(x^2.z- x.y).Vz=0$

ISSN 2347-1921

$V_T = \sqrt{V^2x + V^2y + V^2z}$

$0 < V_T \leq 300{,}000$ Km/Sec

2-18 $2.Y.Z.\, dx - 2.X.Z.\, dy - (X^2 - Y^2).(Z - 1).\, dz = 0$

$2.Y.Z.\frac{dx}{dt} - 2.X.Z.\frac{dy}{dt} - (X^2 - Y^2).(Z - 1).\frac{dz}{dt} = 0$

$2.Y.Z.\, Vx - 2.X.Z.\, Vy - (X^2 - Y^2).(Z - 1).Vz = 0$

$V_T = \sqrt{V^2x + V^2y + V^2z}$

$0 < V_T \leq 300{,}000$ Km/Sec

2-19 $\frac{dx}{y^3.x - 2.x^4} = \frac{dy}{2.y^4 - x^3.y} = \frac{dz}{2.z.(x^3 - y^3)}$

$$\frac{dx/dt}{y^3.x - 2.x^4} = \frac{dy/dt}{2.y^4 - x^3.y} = \frac{dz/dt}{2.z.(x^3 - y^3)}$$

$$\frac{Vx}{y^3.x - 2.x^4} = \frac{Vy}{2.y^4 - x^3.y} = \frac{Vz}{2.z.(x^3 - y^3)}$$

$V_T = \sqrt{V^2x + V^2y + V^2z}$

$0 < V_T \leq 300{,}000$ Km/Sec

2-20 $\frac{dx}{2.x.z} = \frac{dy}{2.y.z} = \frac{dz}{z^2 - x^2 - y^2}$

$$\frac{dx/dt}{2.x.z} = \frac{dy/dt}{2.y.z} = \frac{dz/dt}{z^2 - x^2 - y^2}$$

$$\frac{Vx}{2.x.z} = \frac{Vy}{2.y.z} = \frac{Vz}{z^2 - x^2 - y^2}$$

$V_T = \sqrt{V^2x + V^2y + V^2z}$

$0 < V_T \leq 300{,}000$ Km/Sec

2-21 $\frac{dx}{x+y} = \frac{dy}{x+y} = \frac{dz}{-(x+y+2.z)}$

$$\frac{dx/dt}{x + y} = \frac{dy/dt}{x + y} = \frac{dz/dt}{-(x + y + 2.z)}$$

$$\frac{Vx}{x + y} = \frac{Vy}{x + y} = \frac{Vz}{-(x + y + 2.z)}$$

$V_T = \sqrt{V^2x + V^2y + V^2z}$

$0 < V_T \leq 300{,}000$ Km/Sec

2-22 $\frac{dx}{c.y - b.z} = \frac{dy}{a.z - c.x} = \frac{dz}{b.x - z.y}$

$$\frac{dx/dt}{c.y - b.z} = \frac{dy/dt}{a.z - c.x} = \frac{dz/dt}{b.x - z.y}$$

$$\frac{Vx}{c.y - b.z} = \frac{Vy}{a.z - c.x} = \frac{Vz}{b.x - z.y}$$

ISSN 2347-1921

$V_T = \sqrt{V^2x + V^2y + V^2z}$

$0 < V_T \leq 300{,}000$ Km/Sec

2-23 $\frac{dx}{x^2+a^2} = \frac{dy}{x.y-a.z} = \frac{dz}{x.z+a.y}$

a = cte

$$\frac{dx/_{dt}}{x^2+a^2} = \frac{dy/_{dt}}{x.y-a.z} = \frac{dz/_{dt}}{x.z+a.y}$$

$$\frac{Vx}{x^2+a^2} = \frac{Vy}{x.y-a.z} = \frac{Vz}{x.z+a.y}$$

$V_T = \sqrt{V^2x + V^2y + V^2z}$

$0 < V_T \leq 300{,}000$ Km/Sec

2-24 z.y.dx –z.x. dy - y². dz = 0

$z.y.dx/_{dt} - z.x.\ dy/_{dt} - y^2.dz/_{dt} = 0$

z.y. Vx – z.x. Vy - y². Vz = 0

$V_T = \sqrt{V^2x + V^2y + V^2z}$

$0 < V_T \leq 300{,}000$ Km/Sec

ISSN 2347-1921

2-25 $(y^2 + z^2).\ dx + x.y.dy + x.z.dz = 0$

$(y^2 + z^2).\ {}^{dx}/_{dt} + x.y.{}^{dy}/_{dt} + x.z.{}^{dz}/_{dt} = 0$

$(y^2 + z^2).\ Vx + x.y.Vy + x.z.\ Vz = 0$

$V_T = \sqrt{V^2x + V^2y + V^2z}$

$0 < V_T \leq 300{,}000$ Km/Sec

2-26 $(Y + Z).dx + dy + dz = 0$

$(Y + Z).{}^{dx}/_{dt} + {}^{dy}/_{dt} + {}^{dz}/_{dt} = 0$

$(Y + Z).\ Vx + Vy + Vz = 0$

$V_T = \sqrt{V^2x + V^2y + V^2z}$

$0 < V_T \leq 300{,}000$ Km/Sec

2-27 $(2.x.y.z + z^2).dx + x^2.z.dy + (x.z+1).dz = 0$

$(2.x.y.z + z^2).{}^{dx}/_{dt} + x^2.z.{}^{dy}/_{dt} + (x.z + 1).{}^{dz}/_{dt} = 0$

$(2.x.y.z + z^2).\ Vx + x^2.z.Vy + (x.z + 1).\ Vz = 0$

$V_T = \sqrt{V^2x + V^2y + V^2z}$

$0 < V_T \leq 300{,}000$ Km/Sec

2-28 $z.y^2.dx + z.x^2.dy - x^2y^2.\ dz = 0$

$z.y^2.{}^{dx}/_{dt} + z.x^2.{}^{dy}/_{dt} - x^2y^2.\ {}^{dz}/_{dt} = 0$

$z.y^2.Vx + z.x^2.\ Vy - x^2y^2.\ Vz = 0$

$V_T = \sqrt{V^2x + V^2y + V^2z}$

$0 < V_T \leq 300{,}000$ Km/Sec

2-29 $X.(y^2 - z^2).dx + y^2(z^2 - x^2).dy + z.(x^2 - y^2).dz = 0$

$X.(y^2 - z^2).{}^{dx}/_{dt} + y^2(z^2 - x^2).{}^{dy}/_{dt} + z.(x^2 - y^2).{}^{dz}/_{dt} = 0$

$X.(y^2 - z^2).Vx + y^2(z^2 - x^2).Vy + z.(x^2 - y^2).Vz = 0$

$V_T = \sqrt{V^2x + V^2y + V^2z}$

$0 < V_T \leq 300{,}000$ Km/Sec

2-30 $(y^2 - z^2).dx + (x^2 - z^2).dy + (x + y).(x + y + 2.z).dz = 0$

$(y^2 - z^2).{}^{dx}/_{dt} + (x^2 - z^2).\ {}^{dy}/_{dt} + (x + y).(x + y + 2.z).{}^{dz}/_{dt} = 0$

$(y^2 - z^2).\ Vx + (x^2 - z^2).\ Vy + (x + y).(x + y + 2.z).\ Vz = 0$

$V_T = \sqrt{V^2x + V^2y + V^2z}$

$0 < V_T \leq 300{,}000$ Km/Sec

2-31 $(y^2 + y.z).dx + (x.z + z^2).dy + (y^2 - x.y).dz = 0$

$(y^2 + y.z).{}^{dx}/_{dt} + (x.z + z^2).{}^{dy}/_{dt} + (y^2 - x.y).{}^{dz}/_{dt} = 0$

$(y^2 + y.z).Vx + (x.z + z^2).Vy + (y^2 - x.y).Vz = 0$

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$V_T = \sqrt{V^2x + V^2y + V^2z}$

$0 < V_T \leq 300{,}000$ Km/Sec

2-32 $2.z.(y + z).dx – 2.x.z.dy – [(y + z)^2-x^2 -2.x.z]. dz = 0$

$2.z.(y + z).{}^{dx}/_{dt} – 2.x.z.{}^{dy}/_{dt} – [(y + z)^2-x^2 -2.x.z]. {}^{dz}/_{dt} = 0$

$2.z.(y + z).Vx – 2.x.z. Vy – [(y + z)^2-x^2 -2.x.z]. Vz = 0$

$V_T = \sqrt{V^2x + V^2y + V^2z}$

$0 < V_T \leq 300{,}000$ Km/Sec

2-33 $(x^2 + x.y+y.z).dx–x.(x+ z).dy+ x^2.dz =0$

$(x^2 + x.y + y.z).{}^{dx}/_{dt} – x.(x + z).{}^{dy}/_{dt} + x^2.{}^{dz}/_{dt} = 0$

$(x^2 + x.y + y.z).Vx – x.(x + z).Vy + x^2. Vz = 0$

$V_T = \sqrt{V^2x + V^2y + V^2z}$

$0 < V_T \leq 300{,}000$ Km/Sec

2-34 $y.z(1+4.x.z).dx+x.z.(1+2.x.z).dy+x.y.dz=0$

$y.z(1+4.x.z).{}^{dx}/_{dt} + x.z.(1+2.x.z).{}^{dy}/_{dt} + x.y. {}^{dz}/_{dt} = 0$

$y.z(1+4.x.z).Vx+x.z.(1+2.x.z).Vy+ x.y.Vz = 0$

$V_T = \sqrt{V^2x + V^2y + V^2z}$

$0 < V_T \leq 300{,}000$ Km/Sec

2-35 $(2.x.z+z^2).dx + 2.y.z.dy - (2.x^2 + 2.y^2+x.z – z.a^2).dz = 0$

$(2.x.z+z^2).{}^{dx}/_{dt} + 2.y.z.{}^{dy}/_{dt} + (2.x^2 + 2.y^2+x.z – z.a^2).{}^{dz}/_{dt} = 0$

$(2.x.z+z^2).Vx + 2.y.z.Vy + (2.x^2 + 2.y^2+x.z – z.a^2). Vz = 0$

$V_T = \sqrt{V^2x + V^2y + V^2z}$

$0 < V_T \leq 300{,}000$ Km/Sec

2-36 $(y.dx + x.dy).(a - z)+x.y. dz = 0$

$a = cte$

$(y.{}^{dx}/_{dt} + x.{}^{dy}/_{dt}).(a - z) + x.y. {}^{dz}/_{dt} = 0$

$(y.Vx + x.Vy).(a - z)+ x.y. Vz = 0$

$V_T = \sqrt{V^2x + V^2y + V^2z}$

$0 < V_T \leq 300{,}000$ Km/Sec

2-37 $2.x.dx+(2.x^2.z+2.y.z +2.y^2+1).dy +dz =0$

$2.x.{}^{dx}/_{dt} + (2.x^2.z + 2.y.z +2.y^2+1).{}^{dy}/_{dt} + {}^{dz}/_{dt} = 0$

$2.x.Vx + (2.x^2.z + 2.y.z +2.y^2+1).Vy + Vz = 0$

$V_T = \sqrt{V^2x + V^2y + V^2z}$

$0 < V_T \leq 300{,}000$ Km/Sec

ISSN 2347-1921

2-38 2.x.z.(y – z). dx - z.(x²+2.z).dy + y.(x² + z.y). dz = 0

2.x.z.(y – z). $dx/_{dt}$ - z.(x²+2.z).$dy/_{dt}$ + y.(x² + z.y). $dz/_{dt}$ = 0

2.x.z.(y – z).Vx - z.(x²+2.z). Vy + y.(x² + z.y). Vz = 0

$V_T = \sqrt{V^2x + V^2y + V^2z}$

$0 < V_T \leq 300{,}000$ Km/Sec

2-39 (12.x + 29.y).z.dx – (11.x + 12.y).z.dy – (2.x^2 + 3.x.y – z.y^2). dz = 0

(12.x + 29.y).z. $dx/_{dt}$ – (11.x +12.y).z.$dy/_{dt}$ – (2.x^2 + 3.x.y – z.y^2). $dz/_{dt}$ = 0

(12.x + 29.y).z.Vx – (11.x + 12.y).z. Vy – (2.x^2 + 3.x.y – z.y^2). Vz = 0

$V_T = \sqrt{V^2x + V^2y + V^2z}$

$0 < V_T \leq 300{,}000$ Km/Sec

2-40 y.dx – x.dy + dz = 0

y.$dx/_{dt}$ - x.$dy/_{dt}$ + $dz/_{dt}$ = 0

y.Vx - x.Vy + Vz = 0

$V_T = \sqrt{V^2x + V^2y + V^2z}$

$0 < V_T \leq 300{,}000$ Km/Sec

2-41 $\frac{dx}{y-z} = \frac{dy}{z-x} = \frac{dz}{x-y}$

$$\frac{dx/_{dt}}{y-z} = \frac{dy/_{dt}}{z-x} = \frac{dz/_{dt}}{z-y}$$

$$\frac{Vx}{y-z} = \frac{Vy}{z-x} = \frac{Vz}{x-y}$$

$V_T = \sqrt{V^2x + V^2y + V^2z}$

$0 < V_T \leq 300{,}000$ Km/Sec

2-42 dx + dy + dz = 0

$$\frac{dx}{dt} + \frac{dy}{dt} + \frac{dy}{dt} = 0$$

Vx + Vy + Vz = 0

$V_T = \sqrt{V^2x + V^2y + V^2z}$

$0 < V_T \leq 300{,}000$ Km/Sec

2-43 x.dx + y.dy + z.dz = 0

z. $dx/_{dt}$ + y.$dy/_{dt}$ + z. $dz/_{dt}$ = 0

x.Vx + y. Vy + z. Vz = 0

$V_T = \sqrt{V^2x + V^2y + V^2z}$

$0 < V_T \leq 300{,}000$ Km/Sec

ISSN 2347-1921

2-44 $\frac{dx}{x.(y^2+z)} = \frac{dy}{-y.(x^2+z)} = \frac{dz}{(x^2-y^2).z}$

$$\frac{dx/dt}{x.(y^2+z)} = \frac{dx/dt}{-y.(x^2+z)} = \frac{dx/dt}{(x^2-y^2).z}$$

$$\frac{Vx}{x.(y^2+z)} = \frac{Vy}{-y.(x^2+z)} = \frac{Vz}{(x^2-y^2).z}$$

$V_T = \sqrt{V^2x + V^2y + V^2z}$

$0 < V_T \leq 300{,}000$ Km/Sec

2-45 $dx/dt = Vx = 2.z - 4.x$ V_T=?

$dy/dt = Vy = 2.z - 2.y$

$dx/dt = Vz = 2.x - 2.y - 3.z$

$V_T = \sqrt{V^2x + V^2y + V^2z} = \sqrt{(2.z - 4x)^2 + (2.z - 2.y)^2 + (2.x + 2.y - 3.z)^2}$

$0 < V_T \leq 300{,}000$ Km/Sec

2-46 $dx/dt = (z - 2.y)$

$dy/dt = (z - x)$

$dx/dt = (x + y - 2.z)$ V_T=?

$V_T = \sqrt{(z - 2.y)^2 + (z - x)^2 + (x + y - 2.z)^2}$

$V_T = \sqrt{V^2x + V^2y + V^2z}$

$0 < V_T \leq 300{,}000$ Km/Sec

2-47 $dx/dt = (2.y - z)$

$dy/dt = (y - x)$

$dx/dt = (y - x)$

$V_T = \sqrt{(2.y - z)^2 + (y - x)^2 + (y + z - x)^2}$

$V_T = \sqrt{V^2x + V^2y + V^2z}$

$0 < V_T \leq 300{,}000$ Km/Sec

2-48 $dx/dt = (z - 2.x)$

$dy/dt = (z - x)$

$dx/dt = (3.x + 3.y + 3.z)$

$V_T = \sqrt{(z - 2.x)^2 + (z - x)^2 + (3.x + 3.y + 3.z)^2}$

$V_T = \sqrt{V^2x + V^2y + V^2z}$

$0 < V_T \leq 300{,}000$ Km/Sec

ISSN 2347-1921

2-49 $(x - .a)^2 + (y - b)^2 + z^2 = 1$

$2.(x + a).dx + 2.(y – b).dy + 2.z.dz = 0$

$2.(x+a).\ {}^{dx}/_{dt} + 2.(y – b).{}^{dy}/_{dt} + 2.z.{}^{dz}/_{dt} = 0$

$2.(x + a).Vx + 2.(y – b).Vy + 2.z.\ Vz = 0$

$V_T = \sqrt{V^2x + V^2y + V^2z}$

$0 < V_T \leq 300{,}000$ Km/Sec

V_T=?
a = cte
b = cte

2-50 $Z = (x + a).(y + b) = x.y + b.x + a.y + a.b$

$dz = x.dy + y.dx + b.dx + a.dy + 0 = (x + a).dy + y.dx + b.dx$

${dz}/{dt} = (x + a).{dy}/{dt} + (y + b).{dx}/{dt}$

$Vz = (x + a).\ Vy + (y + b).\ Vx$

$V_T = \sqrt{V^2x + V^2y + V^2z}$

$0 < V_T \leq 300{,}000$ Km/Sec

V_T=?
a = cte
b = cte

2-51 $2.z. = (ax + y)^2 + b$

$2.z = (a^2.x^2 + y^2 + 2.a.x.y) + b$

$2.dz = 2.a^2.x.dx + 2.y.dy + 2.a.x.dy + 2.a.y.dx$

$2.dz = (2.a^2.x + 2.a.y).dx + (2.y + 2.a.x).dy$

$2.{dz}/{dt} = (2.a^2.x + 2.a.y).{dx}/{dt} + (2.y + 2.a.x).{dy}/{dt}$

$2.\ Vz = (2.a^2.x + 2.a.y).\ Vx + (2.y + 2.a.x).\ Vy$

$V_T = \sqrt{V^2x + V^2y + V^2z}$

$0 < V_T \leq 300{,}000$ Km/Sec

V_T=?
a = cte
b = cte

2-52 $a.x^2 + b.y^2 + z^2 = 1$

$2.a.x.dx + 2.b.y.dy + 2.z.dz = 0$

$2.a.x.{dx}/{dt} + 2.b.y.{dy}/{dt} + 2.z.{dz}/{dt} = 0$

$2.a.x.Vx + 2.b.y.Vy + 2.z.Vz = 0$

$V_T = \sqrt{V^2x + V^2y + V^2z}$

$0 < V_T \leq 300{,}000$ Km/Sec

2-53 $x^2 + y^2 + z^2 = C$

$2.x.dx + 2.y.dy + 2.z.dz = 0$

$2.x.\ {dx}/{dt} + 2.y.{dy}/{dt} + 2.z.\ {dz}/{dt} = 0$

$2.x.Vx + 2.y.Vy + 2.z.Vz = 0$

$V_T = \sqrt{V^2x + V^2y + V^2z}$

$0 < V_T \leq 300{,}000$ Km/Sec

V_T=?
c = cte

2-54 $x.(y^2 + z) - y.(x^2 + z) = (x^2 - y^2)z$

$x.y^2 + x.z – y.x^2 - y.z = x^2.z - y^2.z$

V_T=?

ISSN 2347-1921

2.x.y.dy + y².dx + x.dz + z.dx – 2.y.x.dx - x².dy- y.dz – z.dy = 2.x.z.dx + x².dz – 2.y.z.dy - y².dz

(2.x.y – x² – z + 2.y.z).dy + (y² + z – 2.y.x – 2.x.z).dx + (x – y - x² + y²).dz = 0

$(2.x.y – x² – z + 2.y.z).\frac{dy}{dt} + (y² + z – 2.y.x – 2.x.z).\frac{dx}{dt} + (x – y - x² + y²).\frac{dz}{dt} = 0$

(2.x.y – x² – z + 2.y.z).Vy + (y² + z – 2.y.x – 2.x.z).Vx + (x – y - x² + y²).Vz = 0

$V_T = \sqrt{V^2x + V^2y + V^2z}$

$0 < V_T \leq 300{,}000$ Km/Sec

2-55 x² + y² - 2.z = C

2.x.dx + 2.y.dy - 2.dz = 0

V_T=?

c = cte

$2.x.\frac{dx}{dt} + 2.y.\frac{dy}{dt} - 2.\frac{dz}{dt} = 0$

2.x.Vx + 2.y.Vy - 2.Vz = 0

$V_T = \sqrt{V^2x + V^2y + V^2z}$

$0 < V_T \leq 300{,}000$ Km/Sec

2-56 x² + y² + 2.x.y.z – 2.z + 2 = 0

2.x.dx + 2.y.dy + 2.y.z.dx + 2.x.y.dz + 2.x.z.dy – 2.dz = 0

(2.x + 2.y.z).dx + (2.y + 2.x.z).dy + (2.x.y - 2).dz = 0

$(2.x + 2.y.z).\frac{dx}{dt} + (2.y + 2.x.z).\frac{dy}{dt} + (2.x.y - 2).\frac{dz}{dt} = 0$

(2.x + 2.y.z).Vx + (2.y + 2.x.z).Vy + (2.x.y - 2).Vz = 0

$V_T = \sqrt{V^2x + V^2y + V^2z}$

$0 < V_T \leq 300{,}000$ Km/Sec

V_T=?

2-57 2.y.(z – 3) + (2.x – z)= y.(2.x. – 3)

2.y.z – 6.y + 2.x – z = 2.y.x – 3y

2.y.dz + 2.z.dy -6.dy + 2.dx – dz = 2.y.dx + 2.x.dy – 3dy

(2.y – 1).dz + (2.z.dy -6-2.x + 3).dy + (2 – 2.y).dx = 0

$(2.y – 1).\frac{dz}{dt} + (2.z.dy -6-2.x + 3).\frac{dy}{dt} + (2 – 2.y).\frac{dz}{dt} = 0$

(2.y – 1).Vz + (2.z.dy -6-2.x + 3).Vy + (2 – 2.y).Vx = 0

$V_T = \sqrt{V^2x + V^2y + V^2z}$

$0 < V_T \leq 300{,}000$ Km/Sec

V_T=?

2-58 (2.x.y – 1) + (z – 2.x²) = 2(x – yz)

2.x.dy + 2.y.dx + dz – 4.x.dx = 2.dx – 2.y.dz – 2.z.dy

(2.x + 2.z).dy + (2.y - 4.x - 2).dx + (1 + 2.y).dz = 0

$(2.x + 2.z).\frac{dy}{dt} + (2.y - 4.x - 2).\frac{dx}{dt} + (1 + 2.y).\frac{dz}{dt} = 0$

(2.x + 2.z).Vy + (2.y - 4.x - 2).Vx + (1 + 2.y).Vz = 0

$V_T = \sqrt{V^2x + V^2y + V^2z}$

$0 < V_T \leq 300{,}000$ Km/Sec

V_T = ?