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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

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

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

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.

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

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

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

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

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

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

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

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

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

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

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

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

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

$Y . Vx + X . Vy + 2 . Z . Vz = 0$

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

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

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

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

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

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

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

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

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

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

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

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

2-4 $2 . X . Z . dx + Z . dy - dz = 0$

$2 . X . Z \, {}^{dx}/_{dt} + Z . {}^{dy}/_{dt} - {}^{dz}/_{dt} = 0$

$2 . X . Z . Vx + Z . Vy - Vz = 0$

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

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

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

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

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

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

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

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2-6 $(X^2.Z-Y^3).dx+3.X.Y^2.dy+X^3.dz=0$

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

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

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

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

2-7 $a^2.y^2.z^2.dx+b^2.z^2.x^2.dy+c^2.x^2.y^2.dz=0$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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2-11 $(y + z).\, dx + (z + x).\, dy + (x + y).\, dz = 0$

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

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

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

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

2-12 $Z.Y(a - x).dx + [z\text{-}y^2 + (a-x)^2].dy - Y.dz = 0$

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

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

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

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

2-13 $Y.(1+z^2).\, dx + X.(1+z^2).dy + (x^2+y^2).dz = 0$

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

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

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

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

2-14 $(y2 + y.z + z^2).\, dx + (z^2 + z.x + x^2).dy + (x^2 + x.y + y^2).dz = 0$

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

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

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

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

2-15 $Y.Z.\, dx + X.Z.\, dy + X.Y.\, dz = 0$

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

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

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

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

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2-16 (1+y+z). dx+X.(z- x).dy -(1+ x.y).dz=0

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

2-17 Y.(x + 4).(y + z).dx – X.(y + 3.z). dy + 2.X.Y. dz = 0

Y.(x + 4).(y + z).${}^{dx}/_{dt}$ - X.(y + 3.z). ${}^{dy}/_{dt}$ + 2.X.Y.${}^{dz}/_{dt}$ = 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

2-18 Y.Z.dx+(x^2 -y- z.x).dy+(x^2.z -x.y).dz = 0

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

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

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

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

2-19 2.Y.Z. dx – 2.X.Z. dy - (X^2 – Y^2).(Z - 1). dz = 0

2.Y.Z.${}^{dx}/_{dt}$ - 2.X.Z. ${}^{dy}/_{dt}$ - (X^2 – Y^2).(Z - 1).${}^{dz}/_{dt}$ = 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

2-20 $\frac{dx}{y^3.x-2.x^4} = \frac{dy}{2.y^4-x^3.y} = \frac{dz}{2.z.(x^3-y^3)}$

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

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

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

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

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

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

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

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

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

2-22 $\frac{dx}{x+y} = \frac{dy}{x+y} = \frac{dz}{-(x+y+2.z)}$

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

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

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

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

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

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

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

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

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

2-24 $\frac{dx}{x^2+a^2} = \frac{dy}{x.y-a.z} = \frac{dz}{x.z+a.y}$

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

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

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

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

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

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

2-26 $(y^2 + z^2).\ dx + x.y.dy + x.z.dz = 0$

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

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

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

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

2-27 $(Y + Z).dx + dy + dz = 0$

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

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

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

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

2-28 $(2.x.y.z + z^2).dx + x^2.z.dy + (x.z+1).dz = 0$

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

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

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

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

2-29 $z.y^2.dx + z.x^2.dy - x^2y^2.\ dz = 0$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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2-35 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

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

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

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

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

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

2-37 (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

2-38 $2.x.dx+(2.x^2.z+2.y.z+2.y^2+1).dy+dz=0$

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

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

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

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

2-39 $2.x.z.(y - z).dx - z.(x^2+2.z).dy + y.(x^2 + z.y).dz = 0$

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

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

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

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

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2-40 $(12.x + 29.y).z.dx - (11.x + 12.y).z.dy - (2.x^2 + 3.x.y - z.y^2).\ dz = 0$

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

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

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

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

2-41 $y.dx - x.dy + dz = 0$

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

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

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

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

2-42 $\frac{dx}{y-z} = \frac{dy}{z-x} = \frac{dz}{x-y}$

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

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

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

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

2-43 $dx + dy + dz = 0$

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

$Vx + Vy + Vz = 0$

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

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

2-44 $x.dx + y.dy + z.dz = 0$

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

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

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

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

2-45 $\frac{dx}{x.(y^2+z)} = \frac{dy}{-y.(x^2+z)} = \frac{dz}{(x^2-y^2).z}$

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

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

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

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

2-46 $dx/_{dt} = Vx = 2.z - 4.x$ V_T=?

$dy/_{dt} = Vy = 2.z - 2.y$

$dz/_{dt} = Vz = 2.x + 2.y - 3.z$

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

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

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

$dy/_{dt} = (z - x)$

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

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

2-48 $dx/_{dt} = (2.y - z)$

$dy/_{dt} = (y - x)$

$dz/_{dt} = (y + z - x)$

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

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

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

2-49 $dx/dt = (z - 2.x)$

$dy/dt = (z - x)$

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

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

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

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

2-50 $(x + .a)^2 + (y - b)^2 + z^2 = 1$

V_T=?
a = cte
b = cte

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

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

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

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

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

2-51 $Z = (x + a).(y + b) = x.y + b.x + a.y + a.b$

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

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

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

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

V_T=?
a = cte
b = cte

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

2-52 $2.z. = (ax + y)^2 + b$

V_T=?
a = cte
b = cte

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

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

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

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

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

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

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

2-53 $a.x^2 + b.y^2 + z^2 = 1$

V_T=?
a = cte
b = cte

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

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

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

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

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

2-54 $x^2 + y^2 + z^2 = C$

V_T=?
c = cte

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

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

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

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

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

2-55 $x.(y^2 + z) - y.(x^2 + z) = (x^2 - y^2)z$

V_T=?

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

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

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

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

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

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

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

2-56 $x^2 + y^2 - 2.z = C$

V_T=?
c = cte

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

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

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

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

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

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2-57 $x^2 + y^2 + 2.x.y.z - 2.z + 2 = 0$

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

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

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

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

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

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

2-58 $2.y.(z - 3) + (2.x - z) = y.(2.x. - 3)$

$2.y.z - 6.y + 2.x - z = 2.y.x - 3y$

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

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

$(2.y - 1).{}^{dz}/_{dt} + (2.z - 6 - 2.x + 3).{}^{dy}/_{dt} + (2 - 2.y).{}^{dz}/_{dt} = 0$

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

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

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

2-59 $(2.x.y - 1) + (z - 2.x^2) = 2(x - yz)$

$2.x.dy + 2.y.dx + dz - 4.x.dx = 2.dx - 2.y.dz - 2.z.dy$

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

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

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

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

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