359(2): Newtonian Velocity Field in Three Dimensions

This is:

$$\underline{g} = \frac{1}{2(x^2+y^2+z^2)^{3/2}}\left((x^2+y^2)^{3/2}\underline{g}_1 + (x^2+z^2)^{3/2}\underline{g}_2 + (y^2+z^2)^{3/2}\underline{g}_3\right) \quad -(1)$$

where:

$$\underline{g}_1 = -\frac{mG}{(x^2+y^2)^{3/2}}(X\underline{i} + Y\underline{j}) \quad -(2)$$

$$\underline{g}_2 = -\frac{mG}{(y^2+z^2)^{3/2}}(Y\underline{j} + Z\underline{k}) \quad -(3)$$

$$\underline{g}_3 = -\frac{mG}{(x^2+z^2)^{3/2}}(X\underline{i} + Z\underline{k}) \quad -(4)$$

and

$$\underline{g}_1 = (\underline{v}_{F1}\cdot\underline{\nabla})\underline{v}_{F1} \quad -(5)$$

$$\underline{g}_2 = (\underline{v}_{F2}\cdot\underline{\nabla})\underline{v}_{F2} \quad -(6)$$

$$\underline{g}_3 = (\underline{v}_{F3}\cdot\underline{\nabla})\underline{v}_{F3}. \quad -(7)$$

Here:

$$\underline{v}_{F1} = (mG)^{1/2}\frac{(-Y\underline{i} + X\underline{j})}{(x^2+y^2)^{3/2}}$$

(8)

2)

$$\underline{V}_{F2} = (mG)^{1/2} \frac{\left(-Z\underline{i} + X\underline{j}\right)}{\left(X^2+Z^2\right)^{3/2}} \quad -(9)$$

$$\underline{V}_{F3} = (mG)^{1/2} \left(\frac{-Z\underline{i} + Y\underline{j}}{\left(Y^2+Z^2\right)^{3/2}}\right) \quad -(10)$$

Therefore:

$$\underline{g} = -\frac{mG}{r^2}\underline{e}_r \quad -(11)$$

where $r^2 = X^2 + Y^2 + Z^2 \quad -(12)$

<u>QED.</u>