# System of Equations

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Is it possible to determine an analytic solution to the following system of two differential equations for $A$ and $B$:

$$\left(\frac{\partial^2}{\partial x^2}+\frac{\partial^2}{\partial y^2}+\frac{\partial^2}{\partial z^2}+\frac{1}{2}\left(1+\frac{M}{2\sqrt{x^2+y^2+z^2}}\right)\left(\frac{\partial\sigma}{\partial x}\frac{\partial}{\partial x}+\frac{\partial\sigma}{\partial y}\frac{\partial}{\partial y}+\frac{\partial\sigma}{\partial z}\frac{\partial}{\partial z}\right)\right)B=0,$$

$$\frac{dA}{dt}=AB.$$

Furthermore, the boundary conditions are

$$B\to -1\ as\ \sqrt{x^2+y^2+z^2}\to\infty,$$

$$A\to e^{-t}\ as\ \sqrt{x^2+y^2+z^2}\to\infty$$