

Re: Linearity question, is the professor wrong ?

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Lasse.Karagiannis@xxxxxxxxxxx wrote:

Hi all, I am reading a book on control theory written by a professor at Chalmers university of Technology. His name is Bertil Thomas.

At page 116 he gives two examples of what he think is nonlinear differential equations:
 $2y' + y = 5\sqrt{u}$ and
 $12y'' + 6y = 5uy + \sin(u)$

u is an external signal, not yet defined, and is a function of t , only.
 y is the dependent variable, and is a function of t , the independent variable.

It is not written as a system of equations, it is just according to him two examples of nonlinear differential equations.

According to what I've learned a D.E. is nonlinear iff the dependent variable or its derivatives has power not equal to 1, y^2 , $y^{0.5}$, $(dy/dt)^3$, etc.

I've taught a Mathematical Modelling course in the School of Engineering. In this course we classify ODEs using the definition of non-linear that you use, in other words it refers only to the way that y and its derivatives appear in the equations. Another element of classification is whether the coefficients are constant or functions of t . The treatment is not mathematically advanced, being limited to solving 2nd order systems by means of the characteristic equation, but it may be at a similar level to the course you're teaching.

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