

Analytical and numerical solutions to some nonlinear differential equations

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Abstract: We consider three different nonlinear differential equations, for which we obtain a variety of analytical and numerical solutions, in order to highlight some of the work we have done. In particular, we will consider: (i) traveling wave solutions to the density dependent

diffusion Nagumo equation $\frac{\partial u}{\partial t} = \frac{\partial}{\partial x} \left(u^m \frac{\partial u}{\partial t} \right) + u(1-u)(u-\alpha)$; (ii) solutions to the Lane-

Emden equation $y''(x) + \frac{2}{x}y'(x) + y^M(x) = 0$ via the homotopy analysis method; and

(iii) solutions to the Brinkman-Forchheimer momentum equation

$\tilde{\mu} \left(\frac{\partial^2 u}{\partial y^2} + \frac{\partial^2 u}{\partial z^2} \right) - \frac{C_f \rho}{\sqrt{K}} u^2 - \frac{\mu}{K} u + G = 0$ over a rectangular domain via the Rayleigh-Ritz

method.

References

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