

CoE-MaSS weekly seminar series

THE DST-NRF CENTRE OF EXCELLENCE IN
MATHEMATICAL AND STATISTICAL SCIENCES (CoE-MaSS)
PRESENTS A SEMINAR BY

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“Applications of Nonclassical Symmetry Reductions of Nonlinear Reaction-Diffusion Equations”

Friday, 29 June 2018

10h30-11h30

CoE-MaSS Seminar Room, 1st floor,
Math Sci Bldg, West Campus, Wits University.



A special class of reaction-diffusion equations in n dimensions, has full nonclassical reductions to solutions that are not invariant under classical symmetries.

There is a single restriction relating nonlinear diffusivity to nonlinear reaction that always allows nonclassical reduction to the linear Helmholtz equation. This allows us to construct the only known exact unsteady solution to a reaction-diffusion equation with Arrhenius reaction term that follows from the Gibbs non-analytic temperature-dependent probability distribution.

The class of PDE with this nonclassical symmetry is much broader than the nonlinear-reaction diffusion equations. Invariant solutions have been constructed also for

- (i) Nonlinear convection-diffusion-reaction for water transport in unsaturated soil with plant roots.
- (ii) Calcium reaction-diffusion on the spherical surface of a fertilized ovum,
- (iii) Fourth-order diffusion-reaction for a two-phase material

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