Blow-up, rapid growth and asymptotic behaviour in nonlinear differential systems: stochastic equations and numerical methods.

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Abstract: The talk gives a snapshot of recent results concerning diverse classes of highly nonlinear differential systems whose solutions may exhibit convergence to equilibrium, unbounded growth, finite–time stability or finite-time blow-up. One goal is to determine sharp conditions on external forcing, stochastic, or memory–dependent terms, under which there are important quantitative or qualitative changes in the asymptotic behaviour of solutions. Another goal is to develop efficient and computationally tractable numerical methods which preserve these qualitative and asymptotic properties, particularly for stochastic differential equations. The work is joint with several others, especially Brian Colgan, Denis Patterson and Tahani Al-ansari.