

COMPLEX BEHAVIOR IN SYSTEM DYNAMICS MODELS

by

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Nonlinear differential equation systems of the kind used in system dynamics are capable of exhibiting highly irregular, erratic, turbulent or "chaotic" behavior. Conditions for the existence of this phenomenon are discussed and their application in dynamic socio-economic modelling explored. In particular, irregularities in economic cycles might be explained by nonlinear feedback effects in contrast to the usual "random shock" model. Dynamo simulations are used to illustrate the basic concepts involved. The view, often emphasized by Forrester, that policy should not be based on level predictions but should focus on regulating qualitative modes would seem to be strongly supported. The positive economics position associated with Friedman that theories should be judged on their predictive performance would now appear to be too restrictive. Instead, the system dynamics view that the plausibility of model assumptions should be the main basis for establishing theory credibility is strongly reinforced.