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Nota di contenuto

The tool kit / Alan Wilson -- Inter-regional migration in Europe in relation to economic and labour market inequalities / Adam Dennett -- International trade flows / Simone Caschili and Alan Wilson -- Service flows in inter-regional input-output models / Rob Levy and Alan Wilson -- A method for estimating unknown national input-output tables using limited data / Thomas Oleron Evans and Rob Levy -- A dynamic global trade model / Hannah M. Fry, Alan Wilson and Frank -- Global dynamical modelling / Anthony Korte and Alan Wilson -- Space-time analysis of point patterns in crime and security events / Toby Davies, Shane Johnson, Alex Braithwaite and Elio Marchione -- The London riots 1 : epidemiology, spatial interaction and probability of arrest / Toby Davies, Hannah M. Fry, Alan Wilson and Steven Bishop -- The London riots 2 : a discrete choice model, an agent-based model / Peter Baudains, Alex Braithwaite and Shane Johnson -- Richardson models with space / Peter Baudains, Alex Braithwaite, Hannah M. Fry, Toby Davies, Alan Wilson and Steven R. Bishop -- Agent-based models of piracy / Elio Marchione, Shane Johnson and Alan Wilson -- A simple approach for the prediction of extinction events in multi-agent models / Thomas Oleron Evans, Steven R. Bishop and Frank T. Smith -- Urban agglomeration through the diffusion of investment impacts / Minette D'Lima, Francescs R. Medda and Alan Wilson -- From Colonel Blotto to Field Marshall Blotto / Peter Baudains, Toby Davies, Hannah M. Fry, and Alan Wilson -- Modelling strategic interactions in a global context / Janina Beiser -- A general framework for static, spatially explicit games of search and concealment / Thomas Oleron Evans, Steven R. Bishop and Frank T. Smith -- Network evolution : a transport example / Francesca Pagliara, Alan Wilson and Valerio de Martinis -- The structure of global transportation networks / Sean Hanna, Joan Serras and Tasos Varoudis -- Trade networks and optimal consumption / Rob Downes and Rob Levy -- Research priorities / Alan Wilson.

Sommario/riassunto

Geo-mathematical modelling: models from complexity science Sir Alan Wilson, Centre for Advanced Spatial Analysis, University College London Mathematical and computer models for a complexity science tool kit Geographical systems are characterised by locations, activities at locations, interactions between them and the infrastructures that carry these activities and flows. They can be described at a great variety of scales, from individuals and organisations to countries. Our understanding, often partial, of these entities, and in many cases this understanding is represented in theories and associated mathematical models. In this book, the main examples are models that represent elements of the global system covering such topics as trade, migration, security and development aid together with examples at finer scales. This provides an effective toolkit that can not only be applied to global systems, but more widely in the modelling of complex systems. All complex systems involve nonlinearities involving path dependence and the possibility of phase changes and this makes the mathematical aspects particularly interesting. It is through these mechanisms that new structures can be seen to ‘emerge’, and hence the current notion of ‘emergent behaviour’. The range of models demonstrated include account-based models and biproportional fitting, structural dynamics, space-time statistical analysis, real-time response models, Lotka-Volterra models representing ‘war’, agent-based models, epidemiology and reaction-diffusion approaches, game theory, network models and finally, integrated models. Geo-mathematical modelling: Presents mathematical models with spatial dimensions. Provides representations of path dependence and phase changes. Illustrates complexity science using models of trade, migration, security and development aid. Demonstrates how generic models from the complexity science tool kit

can each be applied in a variety of situations This book is for practitioners and researchers in applied mathematics, geography, economics, and interdisciplinary fields such as regional science and complexity science. It can also be used as the basis of a modelling course for postgraduate students.