

CONTENTS

LECTURES

LECTURES ON THE STATISTICAL THERMODYNAMICS OF NONEQUILIBRIUM STEADY STATES

J. Keizer	3
Introduction	
Thermodynamics at equilibrium	
Fluctuation theory	
Thermodynamics at steady state	
Dissipation and reversible processes at steady state	
The electromotive force at steady state	

NONEQUILIBRIUM FLUCTUATIONS: NOISE AND CORRELATION FUNCTIONS IN SOME SYSTEMS

J.M. Rubi	23
Introduction	
Introduction continued: fluctuations about nonequilibrium steady states	
Correlation functions	
The effect of fluctuating sources	

NONLINEAR TRANSPORT AND MODE COUPLING IN FLUIDS UNDER SHEAR

J.W. Dufty and J. Lutsko	47
Introduction	
Uniform shear flow	
Langevin model	
Correlation functions	
Linear hydrodynamic modes	
Nonlinear nonequilibrium mode coupling	
Conclusions	
Appendix A - Linear Langevin model	
Appendix B - Lowest Order nonlinear mode coupling	

NONEQUILIBRIUM THERMODYNAMICS AND STATISTICAL PHYSICS OF THE LIQUID-VAPOUR INTERFACE

D. Bedeaux	85
Introduction	
On the mathematical description of interfaces	
Conservation laws	
Entropy balance	
The phenomenological equations	
Equilibrium fluctuations, general theory	
Equilibrium fluctuations of the height	
The average density profile	
The density-density correlation function	
The direct correlation function in the capillary wave model	
Time dependent fluctuations of the interface	

HYDRODYNAMIC INTERACTIONS AND TRANSPORT PROPERTIES OF SUSPENSIONS

P. Mazur 119

Introduction

Hydrodynamic interactions

Equations of motion; formal solution

Irreducible tensors; induced force multipoles and velocity
surface moments

Determination of induced forces; properties of connectors

Mobility tensors

Wall effects; the spherical container

The fluid velocity field

On transport properties in suspensions

Diffusion

Diffusion and long-range hydrodynamic interactions

Virial expansion of the selfdiffusion coefficient;
non additivity of hydrodynamic interactions

Selfdiffusion in a concentrated suspension

Sedimentation

FUNCTIONAL POISSON BRACKETS FOR NONLINEAR FLUID MECHANICS EQUATIONS

T.F. Nonnenmacher 149

Introduction

Basic concept for Lagrange and Hamilton formalism

The Madelung and Euler fluid equations

The system of Maxwell-Schrödinger equations and its fluid
mechanics analogon

Ginzburg-Landau and dynamical London equations

Bracket formulation for dissipative dynamical systems

LORENTZ MODELS REVISITED OR WHAT ONE CAN LEARN FROM ANTS
IN A LABYRINTH*M.H. Ernst* 175

Introduction

Microscopic theory

Bond percolation problem

More random lattices

Conclusions and outlook

NOISE INDUCED TRANSITION

R. Lefever 217

Modellisation and external noise

Influence of external noise on bifurcations

Shift of a Hopf bifurcation by external noise

AN INTRODUCTION TO NONEQUILIBRIUM PROBLEMS INVOLVING
ELECTROMAGNETIC RADIATION*P.T. Landsberg* 224

Introduction

The nonequilibrium statistical entropy

General properties of electron transition rates

Discrete states: electrons coupled to photons in two-level systems

Continuous photon spectrum and fluxes

Diluted black-body radiation

Efficiencies

Problems and solutions

SEMINARS

SCALAR FLUCTUATIONS FROM EXTENDED NONEQUILIBRIUM THERMODYNAMIC STATES <i>R.E. Nettleton</i>	271
EXTENDED THERMODYNAMICS AND DIFFUSION IN BINARY MIXTURES <i>G. Lebon and M.S. Boukary</i>	279
NONEQUILIBRIUM PLASMA IN HIGHLY PHOTOEXCITED SEMICONDUCTORS <i>R. Luzzi</i>	289
RELAXATION TIMES IN A BISTABLE SYSTEM: THEORY AND EXPERIMENT <i>F. Moss, J.M. Sancho, P.V.E. McClintock and R. Mannella</i>	299
SOME DYNAMICAL ASPECTS OF THE FREEDERICKSZ TRANSITION <i>M. San Miguel and F. Sagués</i>	305
LOCAL EQUILIBRIUM APPROXIMATION IN FOKKER-PLANCK MODELS <i>J.J. Brey and J.M. Casado</i>	318
BROWNIAN MOTION IN CONCENTRATED SUSPENSIONS <i>C. Van den Broeck</i>	328

SHORT COMMUNICATIONS

MUTUAL DIFFUSION IN A BINARY MIXTURE <i>R.F. Rodríguez, M. López de Haro and L.S. García-Colín</i>	343
COMMENTS ON SHOCK WAVE STRUCTURE <i>J.I. Jiménez Aquino and R.M. Velasco</i>	349
GENERALIZED EXTENDED NONEQUILIBRIUM THERMODYNAMICS OF DIFFUSION IN PARAMAGNETICS <i>B. Maruszewski</i>	353
CAUSALITY PROBLEM IN THE RELATIVISTIC KINETIC THEORY <i>M. Dudyński and M.L. Ekiel-Jeżewska</i>	357
SOLUTION OF THE MODEL BOLTZMANN-LORENTZ EQUATIONS FOR PARTICLES WITH SPIN <i>M. Dudyński</i>	361
A MICROSCOPIC DERIVATION OF THE GENERALIZED ONSAGER'S THEORY <i>J.L. del Río and A. Hernández-Machado</i>	365
CORRELATIONS IN A LASER WITH FLUCTUATING PUMP PARAMETER <i>A. Hernández-Machado, M. San Miguel and S. Katz</i>	368
INTEGRO-DIFFERENTIAL EQUATION FOR THE JOINT PROBABILITY DENSITY OF NON-MARKOVIAN PROCESS. PROPERTIES OF THE CORRELATION FOR SHORT TIMES <i>L. Pesquera and M.A. Rodríguez</i>	372

EXACT SOLUTIONS FOR THE STOCHASTIC MALTHUS-VERHULST MODEL

C. Aizpuru, M. Morillo and J.J. Brey 375

DENSITY, ELECTRIC FIELD AND VOLTAGE FLUCTUATIONS AROUND
NONEQUILIBRIUM STEADY STATES NEAR THE GUNN INSTABILITY

A. Diaz-Guilera and J.M. Rubí 379

ON ENERGY EXCHANGE BETWEEN MULTIDIMENSIONAL FLUCTUATING SYSTEMS
IN EQUILIBRIUM

G. Brunk 383

SOME RECENT ADVANCES IN BLACK HOLE THERMODYNAMICS

D. Pavón and J.M. Rubí 387