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Dynamics and Instability of Fluid Interfaces

Proceedings of a meeting, held at the
Technical University of Denmark,
Lyngby, May 1978

Edited by T. S. Sørensen



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EDITORS PREFACE

The present volume is the result of a meeting on the topic "Dynamics and Instability of Fluid Interfaces" held at the Technical University of Denmark, Lyngby (near Copenhagen), in May 1978. The participants were distinguished researchers in the field. They came from such diverse places as Belgium, USA, DDR, Brazil, Bulgaria, Spain, Sweden and Denmark.

If one should describe the atmosphere at the meeting in just one word, this word could be: fascination. We were all deeply fascinated by the range and the scope of the physico-chemical problems covered by the lectures at the meeting. This diversity is very well represented in the content of the present volume. There are contributions on Marangoni effects during liquid-liquid mass transfer of significance for the chemical engineering of liquid-liquid extraction and for the illumination of surface chemical dissipative structures. There are other papers on the formation, thinning, instability and rupture of thin liquid films of utmost importance for foam stability, wetting phenomena and phenomena connected with the biological bilipid cell membrane. Still other papers deal with hydrodynamic, interfacial instabilities enforced by mechanical, chemical and electrical constraints. With the present industrial interest in electrically induced spontaneous emulsification, theoretical studies of this kind are strongly needed. Viscoelastic properties of surface layers of surfactants and macromolecules are also dealt with, and another paper tries to reconcile the theories on Marangoni instability with the theories of longitudinal interfacial waves. Thermally induced Marangoni instabilities and the influence of non-Boussinesquian effects and the Soret effect is the topic of another contribution. Finally, a paper deals with instability phenomena of spherical drops with surface chemical reactions and transfer of surfactants as a model for "kicking drops", spontaneous emulsification and certain cyto-kinetic phenomena, such as the division of the biological cell.

IV

The common denominator for all the contributions is the simultaneous use of concepts from surface chemistry and physics and from hydrodynamics. Theoretic and experimental work is equally represented and even united in many of the papers. It is my hope that this volume will be of value for physicists, physico-chemists, chemical engineers, surface scientists and biologists.

I am grateful to the Technical University of Denmark for the supply of meeting facilities, to Undervisningsministeriets Internationale Kontor and Det Naturvidenskabelige Forskningsråd for economical support in the form of travel grants and to the participants for their most interesting contributions. Finally, the editor of "Lecture Notes in Physics" Dr. W. Beiglböck as well as the Springer-Verlag should be thanked for the assistance made in the publication of this congress report.

Torben Smith Sørensen

15-12 1978

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TABLE OF CONTENT

Instabilities induced by mass transfer, low surface tension and gravity at isothermal and deformable fluid interfaces T. S. SØRENSEN	1
Dissipative structures and nonlinear kinetics of the Marangoni-instability H. LINDE , P.SCHWARTZ and H. WILKE	75
Formation and thinning of liquid films I. B. IVANOV and R. K. JAIN	120
Instability and rupture of thin liquid films R. K. JAIN , I. B. IVANOV, C. MALDARELLI and E. RUCKENSTEIN	140
Mechanical, chemical, and electrical constraints and hydrodynamic interfacial instability A. SANFELD, A. STEINCHEN, M. HENNENBERG, P. M. BISCH, D. VAN LAMSWEERDE-GALLEZ and W. DALLE-VEDOVE	168
Dynamic effects of surfactants and macromolecules on interfacial viscoelastic properties D. T. WASAN, N. F. DJABBARAH, M. K. VORA and S. T. SHAH	205
Interfacial instability and longitudinal waves in liquid-liquid systems M. HENNENBERG, P. M. BISCH, M. VIGNES-ADLER and A. SANFELD	229
Diffusion, reaction and convection at an interface: A few aspects of the stability problem M. G. VELARDE	260
Instability of a spherical drop with surface chemical reactions and transfer of surfactants T. S. SØRENSEN and M. HENNENBERG	276