

Preface

This volume of the Progress of Theoretical Physics Supplement contains the proceedings of papers presented at two successive conferences held in Kanazawa, Japan. One was the special session entitled “The 50th Anniversary of the Alder Transition —*Dawn and Historical Review of the Molecular Simulation*—” as a part of the 21st annual meeting of the Molecular Simulation Society of Japan (MSSJ), November 28, 2007. The other was the “Symposium on The 50th Anniversary of the Alder Transition —*Recent Progress on Computational Statistical Physics*—”, November 29–30, 2007. About 70 researchers participated in the symposium, giving 18 oral and 16 poster presentations. These presentations included two invited talks by Professors Berni J. Alder and Kyozi Kawasaki. This volume includes not only these papers but also several invited papers to celebrate the special issue.

In 1957, the first paper was published in the November Issue of J. Chem. Phys. on the solid/fluid transition in a hard-sphere system via novel methodology “Molecular Dynamics” developed by Alder and Wainwright. This paper indicated clear evidence of the existence of the solid/liquid phase transition in a hard-sphere system. This is called the Alder transition. This paper and their following work created a new paradigm of research on many-body problems, with the development of new technology, that is, “the electronic computer”. Up to now these papers have inspired us and have provided a new perspective on the study of condensed matter physics, fundamental non-equilibrium statistical mechanics, and especially liquid theory. As the year 2007 was the 50th year celebration for publishing this ground breaking paper, we organized several events for “The 50th Anniversary of the Alder transition” in Japan.

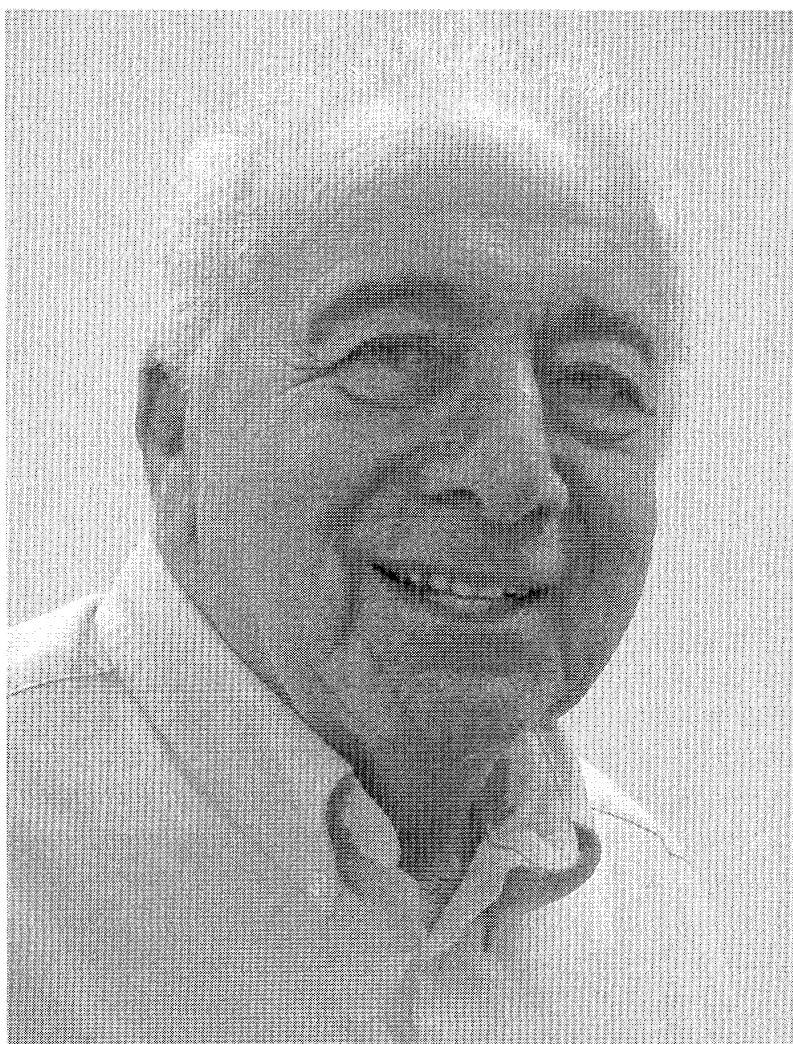
As representatives of the organizing committee of the symposium, we would like to briefly outline how and why the events were organized. We especially focused on the following three important points. Firstly, we tried to make every event impressive from the historical point of view. We hoped that our events would remain in your memory forever. Secondly, we aimed to make a good opportunity to consider the possibility and promising future of the molecular simulation for researchers of various ages. Thirdly, we would like to provide young scientists with a valuable opportunity. We hoped that young physicists in related fields would talk to the founder of the molecular simulation and the non-equilibrium statistical physics and deepened their insight. During the preparation for these events, we often noticed young scientists’ aspiration. Needless to say, we hoped that not only young but also senior scientists throughout Japan would really enjoy “The 50th Anniversary of the Alder transition”. Fortunately, every event was successful thanks to all the unexpected contributions.

In the symposium, the following four topics of the session were discussed. The first topic was ‘Computational Statistical Physics and the Alder transition’. The second was ‘Long-time Tail and Transport Phenomena’. The third was ‘Glass Transition and Mode-Coupling Theory’. The fourth was ‘Multi-Scale Multi-Physics’. Almost all the interesting work was related to the famous works by Professor Alder in non-equilibrium statistical physics. In particular, the second topic has been so

actively discussed in Japan that no less than ten papers were contributed to this issue. The authors of these ten papers have a high motivation to research their topics with much faster and more advanced computers. They were really eager to attend and actively discuss at the symposium. We believe that the organization of our events had a significant influence on the many researchers, especially young scientists. Furthermore, we are confident that these events provided a great opportunity to reconsider the role of the molecular simulation from a historical and future viewpoint. Finally, we would like to express our deepest sorrow for Professor Wainwright, who passed away just on the 50th anniversary. We would like to thank the organizing members of the symposium for all their kind collaboration and help. We greatly appreciate all the contributions from every author.

January, 2009

Yasuaki Hiwatari and Masaharu Isobe



Professor Berni J. Alder