Int. J. Heat Mass Transfer. Vol. 3, p. 76. Pergamon Press 1961. Printed in Great Britain.

BOOK REVIEW

Das Mollier *ix* Diagram für feuchte Luft und seine technischen Anwendungen. W. HÄUSSLER, Hochschule für Maschinenbau, Karl-Marx-Stadt. Verlag von Theodor Steinkopf, Dresden u. Leipzig, 1960. 167 pp.

THE diagrams introduced by Mollier for the representation of thermodynamic properties have been of great utility in engineering calculations; later workers have developed Mollier's methods and extended their field of application. This is particularly the case with the so-called *ix* diagram for moist air, which forms the subject of the present book. It is Professor Häussler's intention to show that, apart from some developments of his own, the "improvements" made by workers subsequent to Mollier have turned out not to be advantageous.

Chapter 3 contains a review of published diagrams for moist air. The authors of presentations differing from that of Mollier are dismissed rather patronizingly, a performance that is made easier by complete omission of reference to the valuable contributions of Busemann and Bošnjaković* in this field. Chapter 4 is devoted to the author's extension of the Mollier diagram to pressures other than atmospheric.

The remaining seven chapters contain discussions of: state changes, vaporization processes, humidity measurement, dehumidification, air-conditioning, drying, and the compression and expansion of moist air. There are twenty-six numerical examples, most of them solved with the aid of *ix* diagrams. More attention is devoted to the thermodynamic than the mass-transfer aspects of the problem.

The chapter on vaporization contains an account of experimental researches carried out by the author on the temperature distribution in the gas and liquid boundary layers adjacent to a vaporizing water surface. These lead the author to the conclusion that the difference between the interface temperature and the bulk-water temperature is about one eighth of the difference between the bulk-water temperature and the wet-bulb temperature; he recommends that this should be taken as valid for other circumstances than those of his experiments, in place of the "pure guesses" which have had to be used hitherto. Apparently he is not aware that very satisfactory methods have been long available for calculating the interface temperature as a function of the ratio of the conductances on the gas and liquid sides.

The author's method of calculating the gas-side mass-transfer conductance is equally primitive: he recommends use of a linear function of air velocity *alone*, and states that this has been satisfactorily confirmed experimentally in Germany and the Soviet Union. The standard equations involving the density and viscosity of the air, and the size and shape of the water surface, are entirely disregarded.

Chapter 6 also contains a remarkable discussion of the Lewis number (used in the older sense of the conductance ratio $\alpha/\sigma c_p$, rather than the more recent sense of a diffusivity ratio). Here some of the pioneering work of Merkel is described, very much in the tone used (it is hoped with more justice) in the present review. According to the author, Merkel's work showed that the Lewis number may vary between 1·45 and 4·12; Merkel nevertheless founded his theory on the brave declaration ("mit der mutigen Aussage") that the Lewis number was unity. Presumably Professor Häussler has misinterpreted Merkel's notation or the description of his data; for the value of the Lewis number, and the factors influencing it, are now well established; and current understanding of the phenomena supports Merkel rather than Häussler. The author admits that Merkel's theory has shown itself to be useful for calculating vaporization processes, but states that further investigations are needed "to bring clarity into the relationships". The reviewer agrees, in a sense.

Nine large-scale diagrams are contained in a pocket at the end of the book. These will be useful.

D. B. SPALDING

* The *entropy*-composition diagram of Bošnjaković does get a reference; but even here doubt is cast on its accuracy.