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On the Use of Mathematics in Journal Papers

Most of the articles in this and other issues of the *AIChE Journal* are written in three languages: English, graphics, and mathematics. The proper blend of these is probably the most efficient, if the most expensive, use of space in an archival journal. I suspect that the mathematical portion of a manuscript is the easiest, and perhaps the most enjoyable, from the author's point of view. However, very often the exact opposite is true for the typist, the manuscript editor, the typesetter, and, most importantly, the reader.

The mechanical problems of producing printed pages that contain large numbers of equations can be overcome with patience and money. Unfortunately, there is not a large supply of either of these commodities. I am concerned, therefore, that mathematics be used to improve the communication of concepts and information, and not to obscure the message. The object should be to retain the largest possible audience while conveying all the pertinent information. The example that I will always remember is a lecture series on general and special relativity by Professor C. Lanczos some years ago. He managed to maintain understanding without going beyond algebra and geometry. Of course, utilization of the concepts has stronger requirements.

Lest you gain the impression that I am antagonistic to advanced mathematical treatments, let me assure you that I am not. I have taught math modeling for many years, and I thoroughly enjoy the elegance and brevity of a well-founded development.

In its present configuration, I believe this Journal goes further than most in assisting a diverse readership

to understand each article. The abstract, scope, and conclusions and significance sections generally contain only English; the other two communication "languages" are confined to the remainder of the manuscript. In addition, the nomenclature list provides a glossary for the mathematical dialect of that particular manuscript. This is necessary, because the permutations and combinations of upper and lower case Greek and English alphanumeric symbols—when subscripts, superscripts, overbars, and the like are added—exceed the total of all written languages in the world. And surely the commonality of SI units should be no deterrent to understanding equations.

Even so, I believe there is room for improvement. Some reviewers respond negatively on potential contributions because the mathematics and the English are interwoven in a manner which makes understanding difficult. These include active, modern researchers who have more than the requisite background. Another problem occurs when speculative models are presented without validation. Advances in calculation procedures could be more often illustrated by brief examples.

I would be among the last to in any way prohibit the use of the proper level of mathematics in any manuscript. However, I encourage authors to address the widest possible audience while maintaining the greatest possible rigor and generality. As engineers, we should encourage utilization through the language of mathematics.

ROBERT H. KADLEC
November, 1976