

NOTATION

\mathbf{v}	Mass velocity of fluid
δV	Volume of an infinitesimal fluid element
dS	An infinitesimal surface element
\mathbf{n}	A unit vector normal to dS
$\frac{D}{Dt}$	Substantial derivative operator
∇	Del operator = $\left(\frac{\partial}{\partial x_1}, \frac{\partial}{\partial x_2}, \frac{\partial}{\partial x_3} \right)$
ρ	Density of fluid, a point function of x_1, x_2, x_3 and time t
ϕ	A scalar potential function of x_1, x_2, x_3
τ	The viscous tensor of a fluid
\mathbf{q}	Vector heat energy flux
v	Magnitude of fluid velocity

REFERENCES

1. Bird, R. B., W. E. Stewart, and E. N. Lightfoot, *Transport Phenomena*, John Wiley & Sons, New York, 1960, pp. 74-81 and pp. 311-7.
2. Sommerfeld, A. *Mechanics of Deformable Bodies*, Academic Press, London, 1964, Aris, R. *Vectors, Tensors and Basic Equations of Fluid Mechanics*, Prentice Hall, New Jersey, 1962, Chapters 3-6.
3. Spiegel, N. R., *Vector Analysis*, Schaum Co. New York, 1959, pp. 122-3, also Reddick H. W., and F. H. Miller, *Adv. Math. for Engineers*, John Wiley & Sons, New York, 1955, 3rd ed., pp. 350-4.

ChE book reviews

An Introduction to the Engineering Research Project

Hilbert Schenck, Jr.
McGraw-Hill Book Co.,
New York (1969)

After having directed many theses and overseen thesis direction for many years, this writer has thoroughly enjoyed reviewing this small (178 pg. 5" x 8") book.

Intended to be an introduction to the engineering research project, it moves swiftly from the selection of a topic through all the major steps to an expected acceptance of a finished manuscript for publication. The author is relentless as he points out the foibles of faculty and academic systems and is no less discerning as he analyzes student "hang-ups" which would hinder the choice and early completion of a desirable

research job. The book is written in contemporary style and should be comprehensible to both the would-be-researcher and his director.

Analyzing the volume in more detail, the reviewer believes that "The Selection of a Project" covers the field well but probably ascribes somewhat more than a normal amount of initiative to a student. Unfortunately the conception of a project more frequently falls on a faculty member than on a student and therefore Chapter 2, "Sources for Project Ideas" (25 pages), is far too long. However the short and meaty "Project Check Sheet" should be noted by everyone.

The chapter "Searching the Literature" attacks the subject with clarity, vigor, and decision. It quickly covers the usual but needed generalizations but follows them up with a well conceived and highly possible case history.

How many times have projects failed for lack of apparatus, time, or cost planning? Here is an author who believes in these efforts as an integral part of the project. Indeed he stresses these activities not only as highly desirable but even mandatory if a real researcher and a satisfactory project are to be produced. His tips are pertinent, timely and frequently annoyingly discerning. Unfortunately the author chooses to elaborate next on his categories of research—an area which he could better have omitted—for although his discussion of "Digital Computer Studies" is a good short approach to a long problem, his "Pedagogical Studies" and "Design and Systems Areas" are far below his overall standards.

In his last two chapters on "Reports" and "Journal Papers and Meeting Presentations" the author has been appropriately and pleasantly brief. He has obviously called upon many experiences, both sad and glad, and has extracted an essence which combines philosophy with practicability.

There is much in this book for new researchers to learn before sad experiences can dishearten or even remove them completely from the field, but the book also may be a gage for a more experienced researcher or research director to recheck his effectiveness.

Surprisingly despite the "heavy" material contained in this book, the style is light, friendly and interesting; it is to be hoped that the experimental project reports will be, too!

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