Brice Carnahan Receives 2009 CACHE Award for Excellence in Computing

Award Citation

ASEE presents the 2009 CACHE Award for Excellence in Computing in Chemical Engineering to Brice Carnahan of the University of Michigan for: pioneering work in introducing computers into chemical engineering education and practice; groundbreaking textbooks – especially the widely used *Applied Numerical Methods*; 40 years of contributions to chemical engineering computing as a founding member of CACHE, and MicroCACHE and MicroMENTOR software for chemical engineering computing. Brice, this award honors you for more than fifty years of exemplary professional life and for your lasting impact on computing practice on a generation of engineering students and professionals.

Rationale for the Award

Over the past 50 years, few have equaled Brice Carnahan's remarkable impact on chemical engineering computing, in research, education, and professional practice. The paragraphs below focus on Brice's earlier work and the attached mini-vita focuses on his work over the decade just prior to his retirement from the standing faculty at Michigan in 2001. Together, they reveal a professional life of continuous involvement and enormous productivity beginning with his doctoral work in the late 1950's.

Brice began his professional life in computing while carrying out his doctoral research at the University of Michigan. In 1959, working with Professor Donald L. Katz, Brice became the Technical Director of the Ford Foundation project, "Computers in Engineering Education." During the ensuing three-year period, over 200 faculty members from nine engineering disciplines and 65 engineering schools produced many useful reports that were widely distributed to other faculty. Brice's lectures and coordination of the reports prepared were instrumental in introducing a whole generation of faculty members to computing and stimulating them to incorporate computing into the curriculum.

Subsequently, also working with Professor Donald L. Katz, Brice became the Associate Director of the NSF project, "Computers in Engineering Design Education." In this project, 40 engineering professors spent a 10-week summer in 1965 attending lectures and preparing computer-aided design projects for use in their courses. Brice was the principal lecturer, introducing computing concepts, numerical and optimization methods, and assisting the faculty in the solution of their design problems. In the following fall, over 1,000 pages of reports were prepared for distribution to other faculty. Then, in the Fall 1966, Brice led a series of two-day workshops at seven locations around the U.S. where two persons from every engineering school were sent to be introduced to the newest approaches for incorporating computers in engineering design courses.

Also, while completing his doctoral thesis, together with Professor James O. Wilkes, Brice began teaching a course entitled "Applied Numerical Methods." During the first offering, in the Fall

1963, course notes were generated on ditto masters just prior to their presentation to the class. Over the next six years, these notes were polished into textual materials, accompanied by on the order of 40 completely documented FORTRAN programs illustrating the various numerical methods. The resulting textbook, *Applied Numerical Methods* by Carnahan, Luther, and Wilkes, published by John Wiley in 1969, instantly became a best seller. Over the ensuing years, over 300,000 copies were sold world-wide for use at universities and by industrial practitioners. Other books on numerical methods were available, but *Applied Numerical Methods* is widely recognized as the book having the most impact on the use of computing throughout the engineering profession. To quote Professor Bruce Finlayson, University of Washington, in talks at the AIChE Centennial Meeting: "This was the only book with a detailed treatment of numerical analysis applied to chemical engineering … It laid out the fundamentals of explicit techniques for solving ODEs (initial value problems) and the Crank-Nicolson method for solving PDEs using finite differences. As such, it influenced all chemical engineers (in the 1960s and early 1970s) to apply the computer to problems in their profession. In the next decade, additional methods like Gear's implicit algorithms and the orthogonal collocation method to the fundamentals provided in 'Applied Numerical Methods', and in the following decade the finite element method could be added." Thus, Finlayson presented Brice's contribution as a foundational one, leading to improvements that we take for granted today.