He was an Associate Editor of the *Journal of Optimization Theory and Applications* and a member of the editorial board of *Celestial Mechanics* since the founding of these journals. He also was a member and secretary of the Theory Committee of the American Automatic Control Council.

Ted had the unique honor of being the first recipient of the American Astronomical Society (AAS) Dirk Brouwer award in 1973 for his excellent work in space trajectory optimization. Further honors and awards would certainly have been his except for his untimely passing.

Richard H. Battin

A Selection of Theodore N. Edelbaum's Publications

"Minimum Impulse Transfers in the Near Vicinity of a Circular Orbit" *Journal of Astronautical Sciences,* Vol. 14, April 1967, pp. 66-73. An analytic solution for the optimum impulsive transfer between nearby low eccentricity orbits is derived. It is shown that two impulses are sufficient, unlike the corresponding fixed time rendezvous where six may be required. This solution was independently derived by J.P. Marec in France at the same time.

"How Many Impulses?," *Astronautics & Aeronautics,* Vol. 5, Nov. 1967, pp. 64-69. A survey article on optimum impulsive transfer.

"Energy Climbs, Energy Turns and Asympotic Expansion" (with H.J. Kelley), *Journal of Aircraft,* Vol. 7, Jan-Feb 1970, pp. 93-95. This is the first paper on the energy height solution to the optimal turning flight of supersonic aircraft.

"Four Body Trajectory Optimization" (with C.L. Pu), *AIAA Journal,* Vol. 13, March 1975, pp. 333-336. An innovative and efficient method of calculating optimum multi-body multi-impulse trajectories is developed. As an example a calculation of optimum trajectories to the interior earth-sun libration point via a lunar swingby is made.

"Effect of Attitude Constraints on Solar-Electric Geocentric Transfers" (with L.L. Sackett) *Journal of Spacecraft and Rockets,* Vol. 13, March 1976, pp. 174-179. One of a series of papers on the development of a sophisticated computer program to calculate optimal geocentric trajectories by a numerical averaging technique. The program optimizes the initial injection orbit and includes the effects of attitude constraints, oblateness, shadowing, and Van Allen radiation. It is currently being adapted to solar sail escape and capture trajectories.

Ted Edelbaum published almost forty papers in the last twenty years, the majority of these being for the AIAA. He also recorded an AIAA tape cassette on "Problems in Orbit Transfer" and held a patent on "Compound Propulsion System" jointly with Edward Pinsley of United Technology Corporation. Among his more significant publications are the following:

"Some Extensions of the Hohmann Transfer Maneuver," *ARS Journal,* Vol. 29, Nov. 1959, pp. 864-865. This paper contains the first description of the optimum transfer from a high circular orbit to hyperbolic energies (three impulses).

"Propulsion Requirements for Controllable Satellites," *ARS Journal,* Vol. 31, Aug. 1961, pp. 1079-1089. Here are derived the optimum high thrust and the optimum low thrust maneuvers for a variety of modifications of circular orbits, for both small and large changes. The most notable result is an analytical solution for the optimum low thrust transfer between inclined circular orbits.

"Applications of Ion Propulsion to NASA Missions" (with H.S. London, W.R. Fimple, and F.W. Gobetz), ARS Preprint 2223-61. Presented at ARS Space Flight Report to the Nation, 1961. This is the first of a long series of papers on mission applications of ion propulsion.

"The Use of High- and Low-Thrust Propulsion in Combination for Space Missions," *Journal of the Astronautical Sciences,* Vol. 9, Summer 1962, pp. 49-60. This appears to be the first paper to point out and analyze the advantages of using high and low thrust systems in combination.

"Theory of Maxima and Minima," *Optimization Techniques,* edited by G. Leitmann, Academic Press, New York, 1962, Chap. 1, pp. 19-30. This is the first chapter of a pioneering and influential book on modern optimization theory.

"Optimum Power-Limited Orbit Transfer in Strong Gravity Fields," *AIAA Journal,* Vol. 3, May 1965, pp. 921-925. Krylov-Bogoliubov averaging is used to obtain analytic solutions to the optimum power-limited tranfers between arbitrary coplanar ellipses and between arbitrary coaxial ellipses—one of the earliest and most instructive examples of the occurance of conjugate points on optimum trajectories.

"Application of a Finite-Difference Newton-Raphson Algorithm to Problems of Low-Thrust Trjaectory Optimization" (with C.P. Van Dive and W.R. Fimple), AIAA Paper 65-698, 1965. A new and very efficient method of numerically calculating optimum trajectories is developed.