

Journal of Guidance and Control Goals, Scope, and Issues

THE science and engineering of control system design has for the last thirty to forty years been an accelerating art. Early in this period the work of Shannon, Bode, Wiener, Nichols, Evans, and others, building upon the classical mathematical foundations, revolutionized our understanding of feedback control. It became possible for systems to be designed and analyzed in a methodical scientific fashion by the practicing engineer. Midway in this period Pontryagin, Kalman, and others opened up a whole new way of analyzing and designing dynamical systems. Our ability to use their results was greatly enhanced by the simultaneous coming of age of the large, general-purpose scientific computer. Most recently, with the rapid advances in computer technology and the increasing availability of low-cost microprocessors of substantial capacity, it is likely that we are on the verge of a revolution in the way control systems are normally implemented. There will be practical controls for larger and even more complex systems than we have ever attempted to date.

This accelerating art has not been, and is not, stagnant. Neither has been its literature. The archival journals are, and always have been, the primary outlet for new disclosures in most scientific and engineering endeavors, including those in our area of dynamics and control. There has been, however, a trend in the control field, both in our own AIAA journals and those of some of our sister societies, for papers to become increasingly theoretical. There have been too few papers which demonstrate, in a practical fashion, how to use the new mathematical results in engineering applications. It is our goal in establishing this new publication to attempt to fill this void by publishing, in addition to new analytic results, papers on practical applications, including those on hardware mechanizations of control systems. Our success in meeting this goal is clearly dependent upon the interest of potential authors, and we seek their support in this regard.

Another measure of the considerable activity in the dynamics and controls field has been the volume of papers appearing in our AIAA archival journals. A sizable fraction of these papers have fallen into the dynamics and control areas. For some time sufficient material has been published in the existing journals to package together in a single discipline-oriented journal for guidance and control specialists. The rate of growth of knowledge in this area indicates that there will continue to be justification for establishment of a new journal in this area. Simultaneously, many of the guidance, control, and dynamics specialists within the AIAA membership (approximately 20% of the members) have been insistent that the AIAA journal structure did not best suit their needs. Articles they wanted to read were spread across what was five archival publications. Results of a membership-wide survey last year identified strong interest in the establishment of a separate journal to serve this section of the society. Accordingly, at their April 1977 meeting, the Board of Directors of the AIAA voted to establish this *Journal of Guidance and Control*.

The formal scope of this new Journal appears on the facing cover. Clearly, the interpretation of this scope by potential authors and the editors is of more importance than the words themselves. In addition to publishing the expected analytically oriented papers, our intention as editors is to emphasize, to the extent we can, the word *applications* in the scope. The membership survey made it quite clear that our potential readership does not want a purely esoteric journal. Articles which show how new ideas or theoretical results can be reduced to practice will be encouraged. Papers on actual

hardware systems and components can be accepted even if they contain no theoretical results. Some tentative criteria for acceptance of these and other applications papers will be in part:

- 1) Novel implementation of previously developed ideas.
- 2) New application of previously developed ideas.
- 3) First journal article on a significant concept or system, whether or not the concept or system is new. It should, however, be recent or of current interest.
- 4) System or component description articles by principal participants on major systems.

There was considerable discussion on the subject of title in the various committees which considered the establishment of this new Journal. A close contender was the *Journal of Dynamics and Control*. This was finally abandoned because of potential confusion of the word "dynamics" with fields such as structures and fluids which are not intended to be within the scope. It is our intent, despite the lack of the word in the title, to publish papers on dynamics as it relates to control. Dynamical analyses, which are defining processes in a way that controls engineers can begin control system synthesis, are within the scope. Those that are more oriented toward structures, aircraft design, etc., will be referred to one of the other AIAA journals. In essence, if the emphasis or likely application of the paper is control system design, it belongs in this new Journal. If the emphasis or likely application is aircraft or spacecraft design it belongs in the *Journal of Aircraft* or the *Journal of Spacecraft and Rockets*.

Avionics and aerospace electronics were other much debated issues. Since these categories describe one of our normal means of implementing control system designs, we definitely will be encouraging the submission of such papers. Digital system elements, navigation equipment, and actuator components are all examples of important control system elements which we hope to cover and which have not been adequately treated in our existing structure. Papers on digital computers, information processing, and software design and verification are within our scope, again providing that the direct or likely application of the work is in a guidance or control system application. It is the advances in these electronic areas which have had one of the most dramatic impacts in recent years on the state of the controls art as it is reduced to practice. This is likely to continue and thus such papers should continue to make good submission to the Journal.

In selecting Associate Editors for our new Journal, we attempted to cover the cross section of activities where we expect to get the bulk of our submittals. We also attempted to recruit a representative cross section of people with theoretical versus applied interests; government, academic, and industry positions; and, where possible, people with editorial experience. The resulting primary areas and the corresponding Associate Editors are: aircraft dynamics and control—Ronald Anderson, USAF Flight Dynamics Laboratory; astrodynamics, guidance, and optimization—Richard Battin, Charles Stark Draper Laboratory (formerly an AIAA *Journal* Associate Editor); spacecraft dynamics and control—D. Lewis Mingori, UCLA (formerly a *Journal of Spacecraft and Rockets* Associate Editor); systems, avionics, and components—Stephen Osder, Sperry Flight Systems; optimal control and estimation—Jason Speyer, University of Texas (formerly a *Journal of Spacecraft and Rockets* Associate Editor and formerly an editor of the *IEEE Transactions on Automatic Control*). In addition, Henry Kelley of Analytical Mechanics Associates, Inc., a former

AIAA Journal Associate Editor, will be serving as Editor-at-Large. Biographical information on these men is included on the next page.

To the extent possible within the dominating constraints of time, plus available and submitted papers, this issue represents a cross section of the type of material we hope to publish in the *Journal of Guidance and Control*. The reader will note that we have selected articles from each of the technology areas which correspond to the Associate Editor assignments listed above. We have included one or more articles in estimation, optimization, spacecraft control, aircraft control, guidance algorithms, inertial components, and actual system implementation. Many of these fit to a greater or lesser extent in the applications category. This is a formative period for this new publication, and we solicit reader feedback on the content of this and future issues. Anyone with an opinion on whether or not we are meeting their needs and interest is encouraged to write to me on the subject.

In addition to the articles discussed above, we have included an additional one which I wish we had not had oc-

casional to consider. It is a memorial to Theodore Edelbaum, who died suddenly and unexpectedly a week before the decision was made to create this *Journal*. Ted was one of the most productive members of the guidance and control community of AIAA. He died in mid-career. As a token of our respect for his accomplishments and as a service to our readership, we have included in the memorial article a bibliography of his key papers in our field and their content. We hope it also can serve as a reference source for those working in the trajectory optimization field.

Finally, there appear below the names of those reviewers who served the *Journal of Guidance and Control* in the first few months after the decision to go ahead was made. We the Editors are grateful both to these people and the authors; together they have provided us with the unusual cooperation which was necessary to publish this issue on schedule. Without their indulgence there would have been no *Journal*.

Donald C. Fraser
Editor-in-Chief

Reviewers for *Journal of Guidance and Control*, June 1 – August 31, 1977

Barbera, Frank J.	DePalma, Leon	Kelley, Henry J.	Price, C.F.	Skira, Charles A.
Bar-Shalom, Yaakov	Duncan, Damon	Krachmalnick, Fred	Rachovitsky, E.	Spriggs, John H.
Berger, John B.	Eller, Don	Lindberg, Eric	Ramnath, Rudrapatna	Velman, J.R.
Calico, Robert A., Jr.	Fitzgerald, Robert J.	Maybeck, Peter S.	Rodriguez, Guillermo	Vigneron, F.R.
Calise, Tony	Fuchs, Arthur J.	Meirovitch, Leonard	Rynaski, Edmund G.	Vinh, N.X.
Chalk, Charles R.	Gustafson, Donald	Morgan, Tom	Schwanz, Robert C.	Wells, William
Dahl, P.R.	Hodapp, Albert E., Jr.	Moyer, H. Gardner	Shaw, Jack	Woodcock, Robert J.
Daly, Kevin	Imrich, Thomas	Olsen, J.J.	Skelton, Robert	

*Because it is difficult to include the reviewers from September, October, November, and December 1977 in this issue of the *Journal*, they will be listed with the reviewers for 1978, in the January 1979 issue.