

GUEST EDITOR'S INTRODUCTION

The role of the Applied Physics Laboratory in the development and deployment of weapons systems that provide defense for the Fleet has been discussed in previous issues of the *Technical Digest* (e.g., Vol. 2, No. 4, "Fleet Defense Systems and Technology" and Vol. 3, No. 2, "The Talos Missile"). Prerequisite to the development of viable, high performance, affordable missile systems has been the establishment of a solid foundation of research and exploratory development. Research provides the new concepts that offer the potential for dramatic improvements in performance and the ideas that lead to the adoption of new materials and cost-reducing production techniques. Exploratory development introduces the practicality of engineering to establish feasibility and to reduce technical risk to a point suitable for embarking on advanced development. Much of the research and exploratory development in missile technology for Naval applications is carried out in the Aeronautics Division of APL. A synopsis of these activities is the basic theme of the first six articles of this issue.

The article by Billig, "Tactical Missile Design Concepts," which establishes the systems approach that is mandatory from the outset in exploratory development, focuses on the particular problem of selecting and developing the propulsion system. A key element in this process and, indeed, a cornerstone of the APL program, has been "Automated Airbreathing Propulsion Test Facilities," as described by Keirse and Cusick. In "Tactical Missile Structures and Materials

Technology," Caywood, Rivello, and Weckesser trace the evolution of design requirements for the selection of structural materials, thermal protection systems, and sensor windows for the Talos, Typhon, and Standard Missiles. The article by Cronvich on "Missile Aerodynamics" shows the close coupling of the guidance and propulsion systems with the aerodynamics, discusses the theoretical and experimental approaches for obtaining aerodynamic data, and focuses on some of the particular problem areas in configurational design.

Griffin's paper on "Computational Fluid Dynamics — A Tool for Missile Design" complements the papers on propulsion and aerodynamics by providing a more detailed discussion of the emerging approach that will undoubtedly revolutionize missile development as the cost of analytically defining flowfields becomes less than that of the traditional experimental procedure. Another facet of the effort directed toward expediting the development of propulsion systems is covered in the article by Lee, Turner, and Benson on "Optical Measurements for Engine Development."

Collectively, these six articles provide an introduction to the research and exploratory development activities in missile technology at APL. Major activities in other areas not included, e.g., guidance and control, are intended to be covered in subsequent issues of the *Technical Digest*.

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