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Editorial

The lead article for this issue of EJAM is Prof. Bernard J. Matkowsky's personalized survey-style article on the theory and application of singular perturbation methods to noisy dynamical systems in the limit of small noise. This article is based on his John von Neumann Prize lecture presented at the Society of Industrial and Applied Mathematics (SIAM) Annual Meeting in July 2017. The John von Neumann Lecture is awarded by SIAM for outstanding and distinguished contributions to the field of applied mathematical sciences and for the effective communication of these ideas to the community. From 1990–1996, Matkowsky was an inaugural editorial board member for EJAM.

In the asymptotic limit of small noise, Matkowsky surveys some of his work on developing innovative asymptotic approaches for calculating such key quantities as the exit time for the escape of a Brownian particle from a confining potential well and the related problem of determining the probability of exit locations on the boundary of the well. Such problems are of singular perturbation type in that the small noise has a large cumulative effect on the solution structure. Refined asymptotic and variational approaches developed by Matkwoksky and collaborators to treat long-standing problems in singular perturbation theory involving boundary-layer resonance, where a conventional application of the method of matched asymptotic expansions fails to determine the solution uniquely, are also surveyed.

Bernard Matkowsky is John Evans Professor of Engineering Sciences and Applied Mathematics, Mathematics, and (by courtesy) Mechanical Engineering in the McCormick School of Engineering at Northwestern University. He received his PhD in 1966 from New York University, now known as the Courant Institute of Mathematical Sciences, under the supervision of Joseph B. Keller. In his career, Matkowsky has been awarded Guggenheim and Fullbright-Hayes Fellowships, as well as two medals by the Russian Academy of Sciences for his important work in combustion theory and synthesis. He is an ISI Highly Cited Researcher and a fellow of SIAM, AAAS, APS, and the American Academy of Mechanics (AAM).

The specific citation for his John von Neumann lecture from the prize selection committee of the Society of Applied Mathematics is as follows:

"The 2017 John von Neumann Lecture prize is awarded to Bernard J. Matkowsky in recognition of his leading contributions to the methods and applications of matched asymptotic expansions and singular perturbatons. He has had a sucessful impact on applications to problems exhibiting resonance, the effect of noise on deterministic dynamical systems, bifurcation phenomena, and to pattern formation. He is an international leader in the mathematical theory of gaseous combustion and combustion synthesis. As an active member of SIAM and a key member of the Northwestern University Mathematics Department, he has inspired a host of excellent applied mathematicians."

From the co-editors-in-chief of EJAM: Martin Burger, John King, and Michael Ward.