

Preface: Aerodynamics, dynamics and control of animal (insects, birds and bats) flight



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Animal flight and swimming have long been of great interest to people. Besides curiosity about how their sophisticated aero- and hydrodynamic feats are performed, researchers are very interested in the mechanics of animal flight and swimming for the following two reasons. One is that biologists need to understand the effects of aero- and hydrodynamic force production and energy expenditure on the physiology, behavior, evolution and other aspects of the animals. The other is that engineers, who desire to develop tiny flying and swimming machines are eager to understand the novel aero- and hydrodynamic mechanisms of the animals and emulate their performances in the design of the small machines. Much effort has been made in this field. This theme issue of *Acta Mechanica Sinica* contains a number of innovative papers regarding the aerodynamics and flight dynamics of insect flight and the hydrodynamics of fish swimming from

seven different groups. Three of the papers concern the aerodynamics of insect flight, dealing in turn with effects of wing aspect ratio on aerodynamics, aerodynamic interaction between forewing and hindwing of a dragonfly, and aerodynamic effects of fluid/structure interaction of a wing. Two of the papers are on flight energetics and flight dynamic stability of insects, respectively. The authors of the other two papers studies the hydrodynamic principles of efficient propulsion of fishes.

I expect that the papers collected in this theme issue will stimulate new thoughts in this active area. I wish to thank all the authors and reviewers for their valuable contributions. I am grateful to the staff of the editorial office of *Acta Mechanica Sinica* for the assistance, and I also thank the editor in chief of *Acta Mechanica Sinica*, Prof. Quan-Shui Zheng, for inviting me as the guest editor of this theme issue.