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On March 8, 2014, Malaysia Airlines flight MH370 disappeared less than an hour after take-off on a route from Kuala Lumpur to Beijing. Its mysterious fate is one of the most intriguing stories of the year 2014, but the available evidence has indicated that the airliner has crashed into the Indian Ocean. Its search and recovery operation also has constituted the most expensive one in the aviation history so far.

In this talk, the speaker will first revisit the study of crashing and ditching of aircraft into the ocean as a classical water-entry problem in applied mathematics. Then the entry of an airliner into the ocean will be modeled as a two-phase fluid-structure interaction problem with compressible aero-hydrodynamics and six-degree of freedom motion.

Numerical simulations are performed by using the OpenFOAM software. Several video simulations of dynamic motion of an airliner flying into the ocean will be shown. Impact damage will also be assessed based on the analysis of the Space Shuttle Challenger disaster.

This is joint work by G. Chen, C. Gu, P.J. Morris, E.G. Paterson, A. Sergeev, Y.-C. Wang and T. Wierzbicki. It will appear in the April 2015 issue of the Notices of The American Mathematical Society as the cover story of the issue.

Goong Chen was born in Kaohsiung, Taiwan in 1950. He received his BSc (Math) from the National Tsing Hua University in Hsinchu, Taiwan in 1972 and PhD (Math) from the University of Wisconsin at Madison in 1977. He has taught at the Southern Illinois University at Carbondale (1977–78), and the Pennsylvania State University at University Park (1978–1987). Since 1987, he has been Professor of Mathematics and Aerospace Engineering, and (since 2000) a member of the Institute for Quantum Studies, at Texas A&M University in College Station, Texas. He has also held visiting positions at INRIA in Rocquencourt, France, Centre de Recherche Mathematiques of the Université de Montréal, the Technical University of Denmark in Lyngby, Denmark, the National University of Singapore, and National Tsing Hua University in Hsinchu, Taiwan. He has research interests in many areas of applied and computational mathematics: control theory for partial differential equations (PDEs), boundary element methods and numerical solutions of PDEs, engineering mechanics, chaotic dynamics, quantum computation, chemical physics and quantum mechanics. He has written over one hundred forty papers, seven advanced texts/monographs, and co-edited four books.

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