

# Applied Aerodynamics, Aircraft Icing, and Magnetohydrodynamics

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## Research goal

Developing aerodynamic analysis methods with applications to aircraft and rocket system

Development of a three-dimensional multi-block structured grid deformation code for complex configurations

- Hybrid of a transfinite interpolation algorithm and spring analogy
- Various aerodynamic codes such as semi-empirical method, panel method, and Navier-Stokes method
- Combination with optimization method

Developing CFD-based methods for simulation and certification of aircraft icing

- Flowfield by finite-volume-method based on Navier-Stokes equations
- 1-shot Eulerian droplet impingement solution and ice accretion with conjugate heat transfer
- Modular approach based on CFD
- Icing certification envelope and CFD in aid of in-flight icing certification

Developing basic theory of MHD shock waves and associated CFD codes

How to develop a numerical scheme capable of describing the non-classical shock waves without explicit treatment of the viscous and dispersive inner profiles

- A method to separate Alfvén wave from the slow and fast magnetoacoustic waves

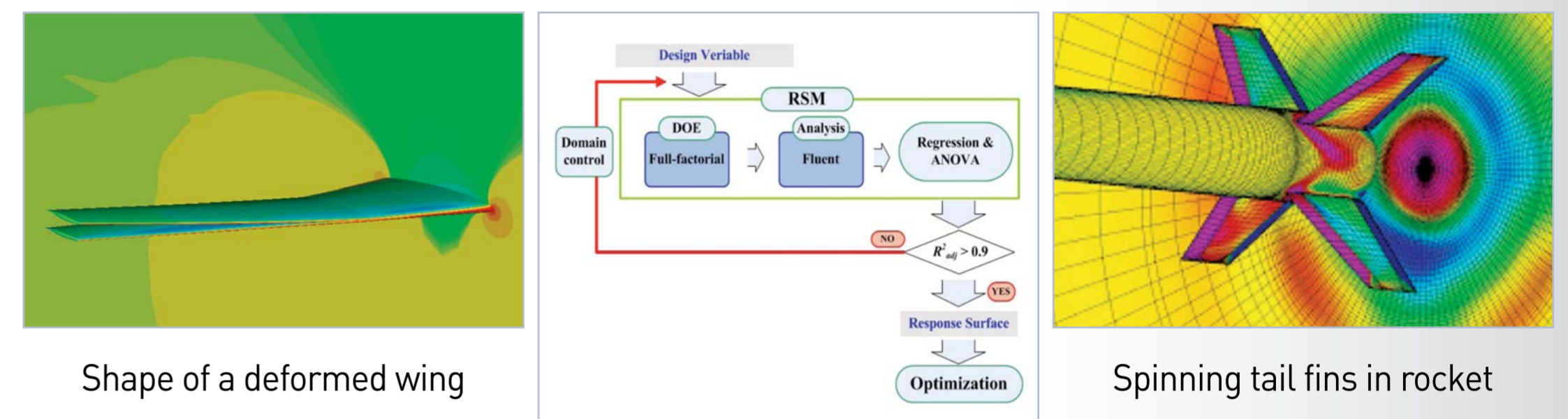
## Funding

### Domestic

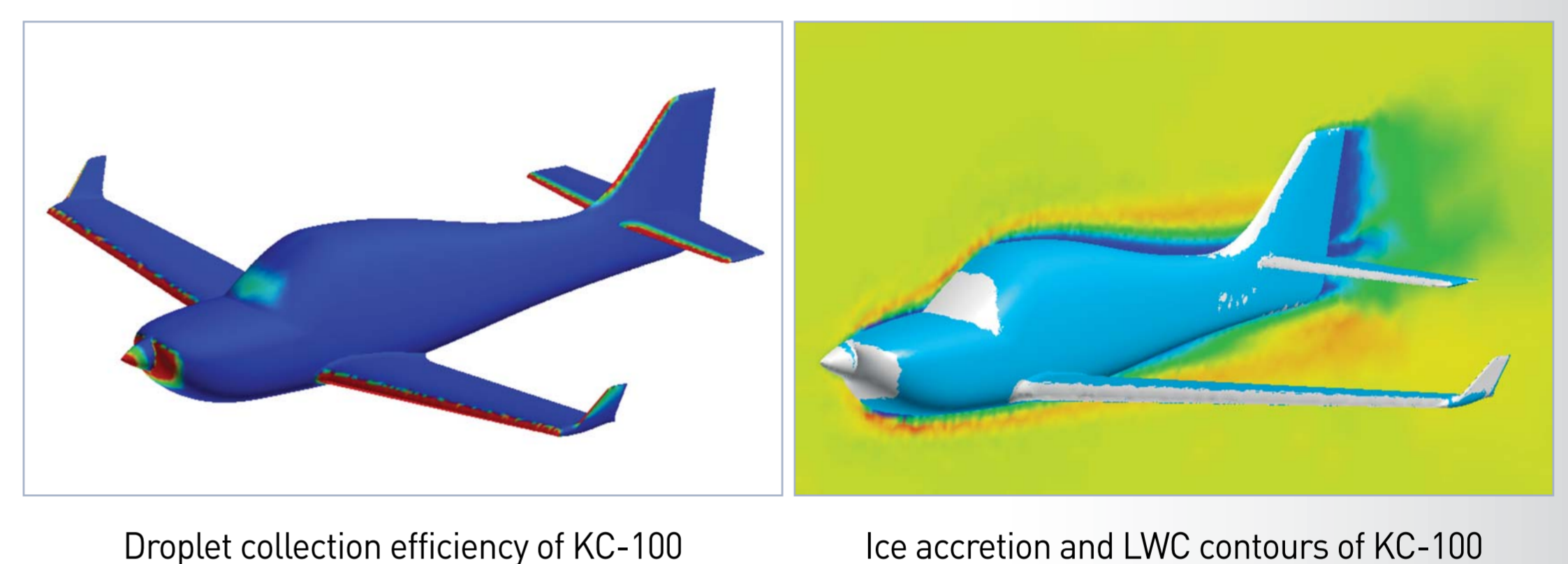
Korea Research Foundation	(2005-2011)
Hanwha Inc.	(2001-2011)
Agency for Defense Development	(2003-2008)
Korea Aerospace Industries Inc.	(2008-2010)
Korea Aerospace Research Institute	(2006-2011)

## Milestones

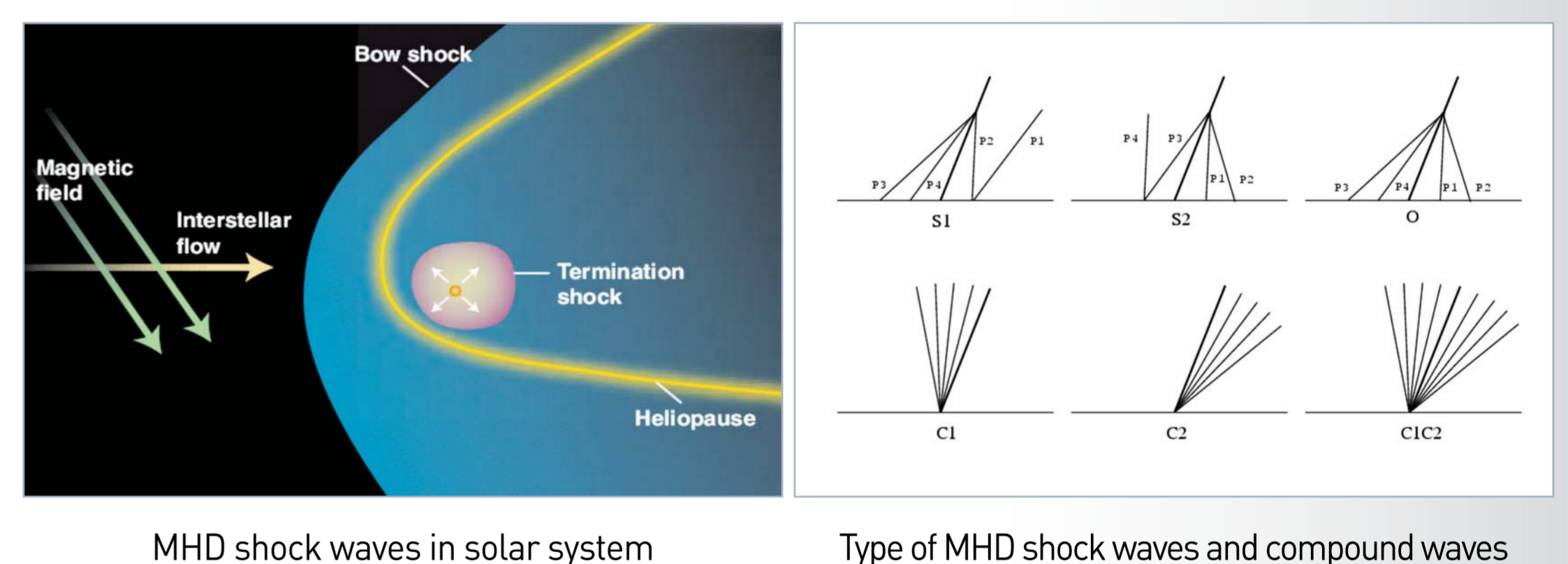
Aerodynamics of deformed aircraft wing and aerodynamic design of rocket system



Aircraft icing physics and simulation



Nonlinear waves in MHD space plasma



Dissemination of research outcomes

Journal of Computational Physics (Elsevier; 1998)  
Journal of Plasma Physics (Cambridge; 1997 A, B)  
Geophysical Review Letters (AGU; 1997)  
AIAA Conference (AIAA; 2002, 2010)  
Korean Society for Aeronautical & Space Sciences Journal (KSASS; 2005-2009)  
Korean Society of Computational Fluid Engineering Journal (KSCFE; 2008)

## Collaborators

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