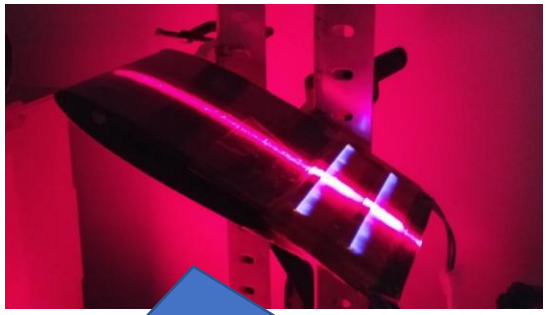
FACULDADE ENGENHARIA
Departamento de Engenharia Eletromecânica

M. Abdollahzadeh, J. Páscoa, F. Rodrigues

System for ice detection/prevention and flow control based on the impression of sliding plasma actuators with dielectric discharge barrier

This innovation uses advanced plasma actuators made of ultra-thin, flexible layers to protect aircraft and other critical surfaces from ice. It features three smart electrodes: one for generating plasma wind, another for heat delivery, and a third for sensing. Plasma actuators induce a wall jet or the so-called ionic wind that results in alteration of the flow.



Ionization region and the wall jet

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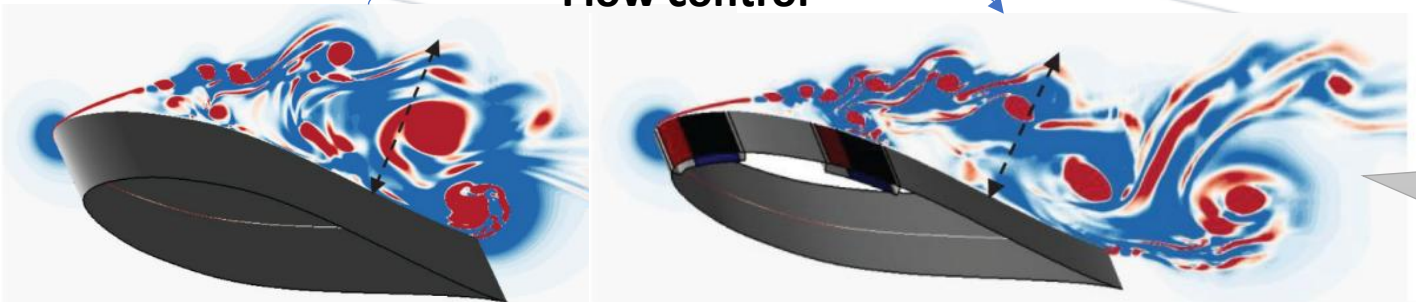
(71) Requerente: **UNIVERSIDADE DA BEIRA INTERIOR** [PT/PT]; Convento de Santo António, 6201-001 Covilhã (PT).

(72) Inventores: **ABDOLLAHZADEHSANGROUDI, Mohammadmahdi**; Rua Morais do Convento, Residência dos Docentes, UBI, 6200-371 Covilhã (PT). **PÁSCOA MARQUES, José Carlos**; Urb. Quinta do Pinheiro, Lote 6, 4º Dto, 6200-552 Covilhã (PT). **FREIRE RODRIGUES, Frederico Miguel**; Beco da Palhota n.º2, 6200-641 Sarzedo (PT).

Flow control



When plasma actuator is activated with high voltage AC signal on primary exposed electrode, the effect is a surface body force that acts as wall jet to control the flow

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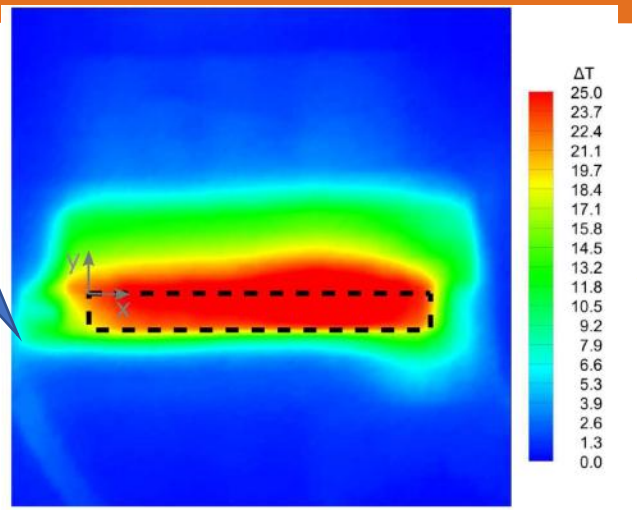
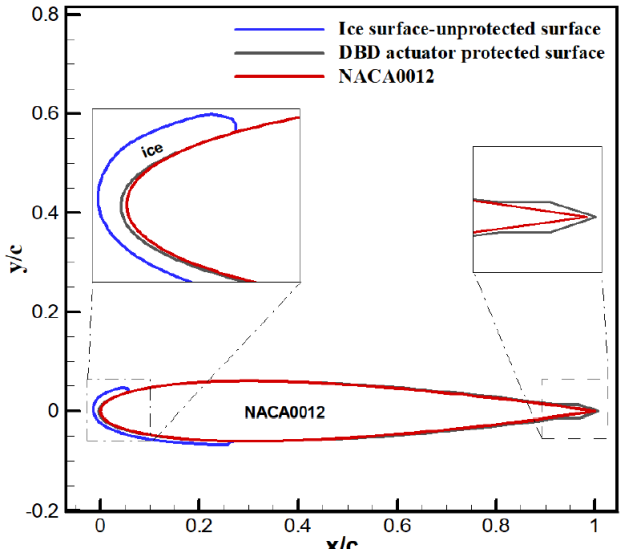
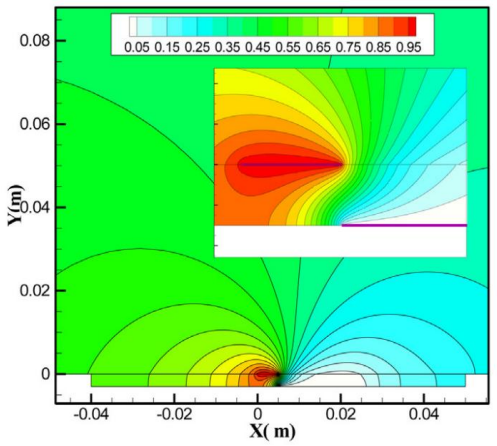
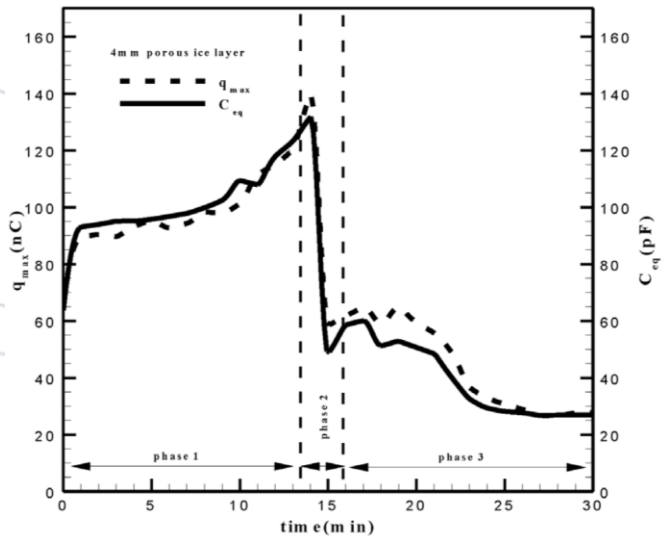
Powered by AC voltage to the primary exposed electrode and powered by C, and nanosecond-pulse voltage the formation of plasma sheet heats the surface and at the same time controls airflow. The heating effect is used to melt the ice layer on the surface.



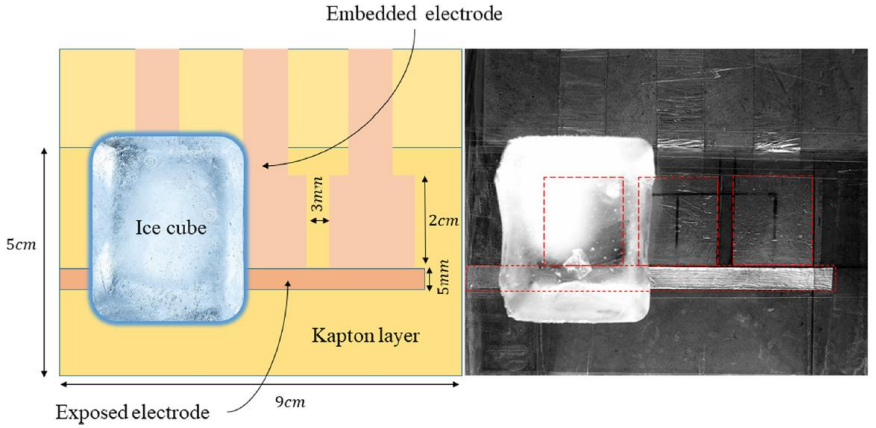


The electrical characteristics of the DBD are calibrated to detect the ice or water on the surface. The DBD is operated as a mapper of the ice location on large surfaces.





DBD can sense the location of the ice on the surface!



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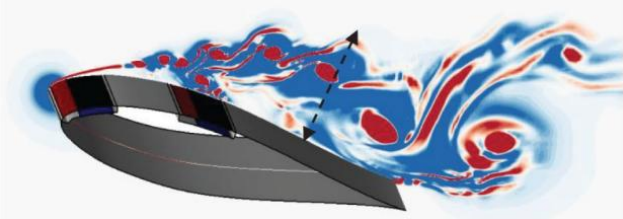

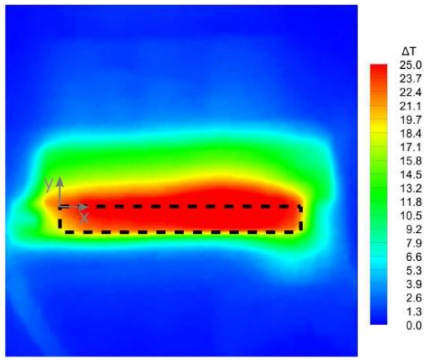

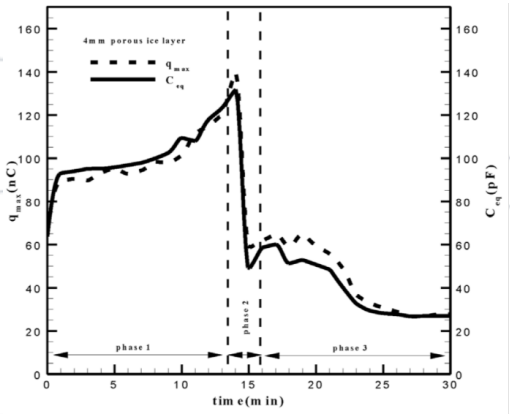

Unified Plasma Solution

- Flow Control
- Deicing Mechanism
- Ice Sensing

→ Simultaneous active flow control/deicing/ice sensing device