DEVICE TO ATTENUATE TURBULENT VORTICES IN WAKES FROM AERODYNAMIC PROFILES

Description:

Any type of aircraft, both in its formation flight configuration and in landing and takeoff operations at airports, by having wings of a finite length, produces a strong rotational movement in the area at the end of its wingspan. This vortex present in the wake of aircraft results, therefore, from the difference in pressures on both sides of the face of the wing that produces lift and allows its flight. These vortices present in the wakes of the wings are very harmful since they can affect the maneuverability of the aircraft that come next or limit the frequency of flights at an airport. The present invention presents a device that injects fluid in the axial direction to the movement and that allows the wing tip vortex to be disturbed, thus achieving a decrease in its intensity. The device is made up of two distinct parts: a fluid injector and a duct that directs the fluid towards a rear edge of the aerodynamic profile. The amplitude and frequency of this injection are controlled. Thus, the control, and once the injection amplitude and frequency parameters have been correctly chosen, allows the wingtip vortex to be attenuated.

Keywords:
Control, Aerodynamics, Vortices

Sectors:
Engineering, Environment and Energy, Security, Protection and Defense

Areas:
Hardware / Devices / Components, Environmental and Forestry, Mechanics, Energies, Technological Improvements, Protection and security, Transport

Advantages:

- A reduction in the intensity of the vortex present in the wake of wing models or generated by aerodynamic profiles in the case of hydraulic turbomachines is achieved. This device can be used to attenuate the wake vortex and therefore could be applied to increase the frequency of flights at airports or reduce losses in turbomachines. - In economic terms, it means lower fuel consumption because aircraft wait less for takeoff and landing operations or electrical consumption is lower in the case of turbomachines as they have fewer losses induced by the vortex. The environmental impact of reduced greenhouse gas emissions is also obvious as a result of these two improvements. - The system is mechanically simple and allows the amplitude and frequency control to be adapted to each incident flow situation.

Uses and Applications:

This device is of special interest in aircraft to obtain an improvement in the operation of the wings, therefore it is indicated for manufacturers in the aeronautical industry. In addition, it is also applicable to manufacturers in the industrial sector of hydraulic turbomachines such as axial dynamic pumps or wind turbines. In short, for any type of body that contains an aerodynamic profile and in which we want to reduce the effects of the vortices formed due to the structure-fluid interaction in the industry, energy and environment sector.

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