DocumentID	241333
Vortragstitel	Insect Shielding Krüger - Structural Design for a Laminar Flow Wing
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Preisträger	
Vortragssprache	englisch
Seiten	6
Veranstaltung	Deutscher Luft- und Raumfahrtkongress 2011
Veranstaltungsort	Bremen
Veröffentlicht in	Deutscher Luft- und Raumfahrtkongress, Tagungsband - Manuskripte, 2011; Seite 55 - 61; DGLR e.V.; Bonn; 2011
Stichwörter	-
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Abstract

For concepts of transport-aircrafts with laminar flow on the upper side of a wing, a Krüger-Flap is a common choice for the Leading-Edge-Device. For two important reasons: This device can shield the Wing-Leading- Edge (LE) from insects within the lower airspace and it avoids the flow-disturbing step of a slat's trailing edge.
Aiming at laminarity results in a design-challenge of contradicting requirements: High settings and no disturbance behind the stagnation point are standing against a thin profile with limited possibilities of modification. Going for a conventional design ends in an impasse of a lack of space, since typical high-lift-kinematics are working in a layer. This layer turns out to be too small, to house a mechanism which shall be capable to achieve the long travel and the large rotation angle of a laminar wing's Krüger.
A spatial-kinematics that solves this challenge is the pyramidal kinematics. The focus here is on its adaption to the application to a Laminar-Wing's Krüger-Flap. Its principle function is explained as well as its limitations. Furthermore a damage-tolerant design and a suitable actuation are described.