A multi-fidelity aerodynamic analysis of a solar-powered UAV

Katarzyna KANIA[1,a *]

[11]Warsaw University of Technology Institute of Aeronautics and Applied Mechanics, Faculty of Power and Aeronautical Engineering, Nowowiejska 24, 00-665 Warsaw, Poland

[a]katarzyna.kania3.dokt@pw.edu.pl

* corresponding author

Abstract. The subject of this study is the aerodynamic analysis for a solar-powered UAV using approaches of varying fidelity. Two software were chosen – PANUKL which evaluates inviscid aerodynamic characteristics and FLUENT which allows to model the viscous flow. In the study, not only the results between both software are compared, but also the influence of model preparation and settings within a software are explored, including various turbulence models. The main conclusion is that at the sea level, low-fidelity methods are sufficient as long as problems specific for this case are taken into account during model preparation. However, this does not apply to flight at high altitudes, where the Reynolds number is extremely low.

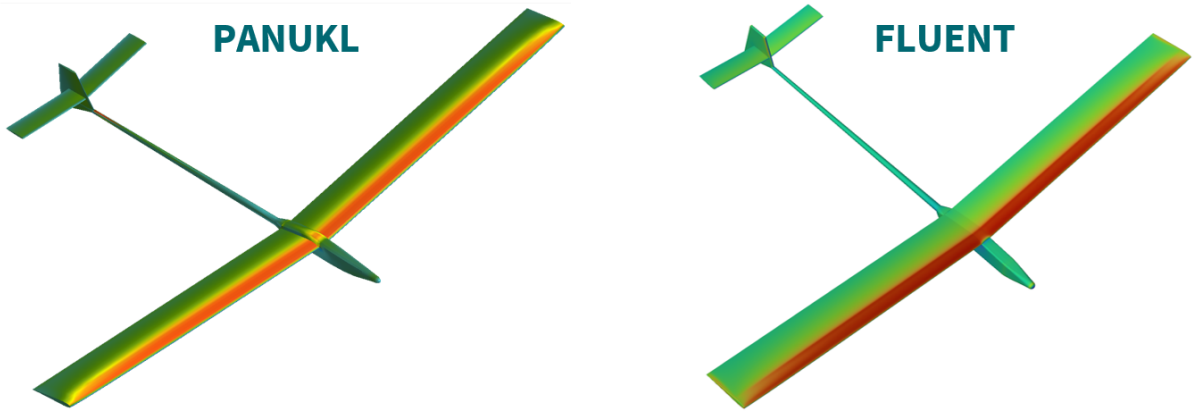

Figure 1. Exemplary pressure coefficient distribution in PANUKL and Ansys FLUENT.