

Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

String Stability in Energy-Saving Formation Flight¹ PHILIPPE CHATELAIN, JAMES RIEHL, ESTEBAN HUFSTEDLER, JULIEN HENDRICKX, Universite Catholique de Louvain — Formation flight of fixed-wing aircraft provides the opportunity to save substantial energy by exploiting the upwash created by vortical wakes. For the most efficient flight, the aircraft need to carefully track the relative wake position of their leader, which may move due to turbulence or maneuvering of the leader. The tracking errors may grow as the disturbances propagate to aircraft further downstream, resulting in ‘string instability’. This is more commonly examined in automobile platoons, and has not been adequately examined with respect to efficient aircraft formations. We discuss some pitfalls and trade-offs involved in designing string stable controllers for this system, and describe a controller that achieves both string stability and energy efficiency.

¹This project has received funding from the European Research Council under the European Unions Horizon 2020 research and innovation program, grant agreement No 725627.

Esteban Hufstedler
Universite Catholique de Louvain

Date submitted: 31 Jul 2019

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