Dear editors and reviewers,

I have the pleasure of submitting the manuscript entitled “Structured Control Design for a Highly Flexible Flutter Demonstrator” authored by, Manuel Pusch, Dr. Daniel Ossmann (myself) from the German Aerospace Center and Dr. Tamas Luspay from the Systems and Control Lab, Budapest, to be considered for publication as research article in the MDPI Aerospace Journal.

The paper presents a novel approach to blend inputs and outputs of a system introducing an H2-optimal blending algorithm to fuse sensor and actuator signals in a system and isolate elastic modes to be controlled or stabilized. The proposed blending results in a simplified model description allowing for simple single-input single-output design of the controllers. With respect to the considered application in the paper – a highly flexible flutter demonstrator – two dedicated optimization problems are defined to allow for the tuning of structured controllers via robust control optimization techniques. These generic problems can be used to solve for optimal controller gains for robust and gain scheduled controllers, without the classical point wise design.

Besides these profound theoretical contributions, the second part of the article is focused on the application to the FELXOP aircraft. A detailed description of the applied tools is provided, allowing the readers to reproduce the tool chain and apply it to their own problems. A baseline control system to navigate the aircraft fully autonomously and a flutter controller to extend the aircraft’s operational range is discussed. The latest results from an extensive simulation based verification campaign are provided, which pave the way to the real flight test to be performed in 2019.

Best regards,

Dr. Daniel Ossmann