# Aviation 2019 Call for Papers Supplemental Information

## Special Sessions Sponsored by the Applied Aerodynamics Technical Committee (APATC)

### Waverider Technology Development

2019 is the 60th anniversary of the genesis of the waverider design concept by Terence Nonweiler, which has played a significant role in the development and maturation of operational hypersonic flight. As such, this special session provides a timely forum for waverider technology researchers to present ongoing and future development efforts related to the waverider design concept. The special session will contain a necessary blend of industry, academic, and government agencies to address the impact this technology area will have on future system development.

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### H2020 Smart Morphing & Sensing (SMS) Project

The Smart Morphing & Sensing (SMS) project is a multi-disciplinary upstream project that employs intelligent electro-active actuators that will modify the lifting structure of an aircraft and to obtain the optimum shape with respect to the aerodynamic performance (high lift & low drag). This will be accomplished using a new generation of fiber optics-based sensors allowing distributed pressure measurements and in-situ real-time optimization of the aerodynamic characteristics. This will allow to attenuation of flow separation and nuisance instabilities such as aileron flutter and also to reduce trailing-edge noise and other vibration sources in flight, coming from interactions between wing and fuselage and engine or from critical meteorological phenomena as gusts, having major impact on safety.

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### Low Speed and Motorless Flight

This session explores research topics relevant to sailplanes and other highly efficient low-speed aircraft such as solar- and human-powered airplanes. Papers are solicited that address low-drag aerodynamics; design optimization; flight mechanics, dynamic soaring and trajectory optimization for efficient use of the atmosphere; variable geometry concepts; structural optimization, and aeroelasticity of high aspect ratio wings. Both analysis and experiment are of interest, as are topics involving the interaction of multiple disciplines. The session will be organized cooperatively by the Applied Aerodynamics TC and OSTIV (Organisation Scientifique et Technique Internationale du Vol `a Voile — the International Scientific and Technical Soaring Organization).

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### Application of Natural Laminar Flow

Natural Laminar Flow (NLF) is a technology that has been recognized for decades as having the potential to reduce aircraft drag and thus both fuel burn and emissions. Applications of NLF have typically been limited to vehicle components with low leading-edge sweep and low Reynolds number because increasing either of these parameters generally increases the growth of boundary layer instabilities that ultimately lead to transition. This session will focus on evaluating

aerodynamic design approaches to enable large regions of NLF to be obtained on wings with sweeps and chord Reynolds numbers representative of transonic transports. The validation of aerodynamic prediction methods by comparing predicted transition location with measured boundary layer transition location on swept wing geometry through wind tunnel or flight testing is highly desirable.

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## Commercial Supersonic Activities

There is continuing and renewed interested in addressing the technical barriers to commercial supersonic vehicles. These topics include sonic boom, airport noise, high-altitude emissions, airframe performance, propulsion performance, flexible structures, and operations. Research in computational prediction, experimental measurement, design, certification, and uncertainty quantification of these disciplines related to supersonic vehicles is requested.

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## Aerodynamic-Structural Modeling, Optimization, and Test Techniques for Flexible Wing Technology

This special session addresses multidiscipline analysis, design, optimization (MDAO) and experimental methods for adaptive aeroelastic wing technology. Reducing airframe operational empty weight using advanced composite materials is one of the major considerations for improving energy efficiency in modern aircraft design. With the increase in flexibility of modern high aspect ratio wing structures, active wing shaping control using advanced novel control effectors are design options that can aeroelastically compensate for drag penalty due to non-optimal wing shapes during off-design cruise. Concepts such as variable camber continuous trailing edge flap, adaptive compliant trailing edge, and other novel control effectors are of interest as enabling technologies. The proposed session is organized along the MDAO theme "Aerodynamic-Structural Modeling, Optimization, and Test Techniques for Flexible Wing Technology" with the purpose to disseminate research results and foster technical interchange with the diverse aircraft research communities in the technical areas of aerodynamics, aeroelasticity, aeroservoelasticity, experimental methods for flexible wings, and active wing shaping control. Papers are sought in these technical areas that address all related aspects of flexible wing technology.

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