AePW-3 Telecon

November 5, 2020
Agenda: November 5, 2020

- AePW-3 Website / Schedule / SciTech 2021 / Organizing Committee
- AePW-3 group telecons are held on first Thursday each month
- Large Deflection Working Group, Markus Ritter
  - Telecons are held on second Thursday each month.
- X-56 Flight Test Working Group, Alex Chin
  - Telecons are held on third Thursday each month.
- High Angle of Attack Working Group, Pawel Chwalowski
  - Telecons are held on fourth Thursday each month.
- High Speed Working Group, Eric Blades
- Special Presentation, Grand Challenge, by Jeff Slotnick, Boeing
- Next AePW-3 Telecon: December 3
Microsoft TEAMs platform. We are deleting old Webex meeting invitation. Please update your calendars.

AePW-3 website: https://nescacademy.nasa.gov/workshops/AePW3/public/

• Grand Challenge, Special Session

• SciTech2021
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Toward the next Aeroelastic Prediction Workshop (AePW-3): Requesting Conference-Associated Support

### Requesting Co-sponsoring between Structural Dynamics TC & Applied Aerodynamics TC:
- Specific SDTC items are in Blue
- Specific APATC items are in Green

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#### 2019
- IFASD 2019 Discussion Session
- SciTech 2020 Evening Discussion Sessions

#### 2020
- **Aviation 2020**
  - Special session on Large Deflection FSI (oral presentations only) **canceled!!!**
  - Evening discussion sessions: Kick off meetings for AePW-3 **Canceled**
- **SciTech 2021**
  - Special session reporting intermediate results (oral presentations only)
  - Evening discussion sessions for collaboration among participants

#### 2021 and/or IFASD 2021
- AePW-3 (oral presentations only)
- Evening discussion session to debrief workshop(s)

#### SciTech 2022
- Special sessions on results (technical publications & presentations)
Agenda: November 5, 2020

• **Special Presentation, Grand Challenge, by Jeff Slotnick, Boeing**

  • We have a special session at Scitech 2021 under the topic: CFD2030. It actually shows up as a separate Technical Discipline
  
  • We held a Forum 360 on Grand Challenge problems at Aviation 2020 as a precursor to this paper session.
  
  • Our paper session will have 3 papers presented live, one for each Grand Challenge problem, and we will hold a live discussion panel session to gather feedback on the GC problems.
  
  • The 3 papers to be presented are as follows:
    
    1: “A Grand Challenge for the Advancement of Numerical Prediction of High Lift Aerodynamics”, Jeff Slotnick (Boeing) and Dimitri Mavriplis (University of Wyoming)
    
    
    
    • All this is being done under the auspices of the CFD2030 Integration Committee.
    
    • The CFD2030 sponsored events are listed at our web site: [cfd2030.com](http://cfd2030.com)
**Advancing High Lift Aerodynamic Prediction**

Series of Technical Challenges

Focus on key technical obstacles for specific time periods to make progress towards solving the grand challenge.

Sub-Challenge #1

- **1-3 years**
- Representative WT Geometry
  - S&C (tail/control surfaces/trim)
  - Cross-flow effects
  - Engine propulsion effects
  - Ice effects
  - CFD-generated data compared to WT data

Ground-Based Experimental Testing

FLOW PHYSICS PREDICTION

Sub-Challenge #2

- **3-6 years**
- Generic Flight Vehicle
  - Sub- or full-scale flight geometry
  - Flight Re
  - Quasi-steady flight
  - Basic maneuver
  - Dynamic structural/system response
  - CFD-generated data at specific points in the maneuver trajectory compared directly with flight-derived data

Sub-Challenge #3

- **6-10+ years**
- Low-Speed Wind-Up Turn

Grand Challenge

- **15+ years**

**LOW-SPEED WIND-UP TURN**

Generic Flight Vehicle

- Full scale flight geometry
  - Flight Re
  - Dynamic, maneuvering flight
  - Dynamic structural/system response
  - Environmental effects
  - Engine power effects

Data from numerical simulation of the dynamic maneuver fed into CFD-based flight simulation, then proof-of-match between flight simulation and flight experience

* Potential flight test vehicle configuration

**Representative WT Geometry**

- Landing/TO configuration + nacelle/pylon
- Re effects (atmospheric, pressurized, cryogenic environments)
- Interactional flow physics (separation, vortex flow)
- Static aeroelastics
- CFD-generated data compared to WT data

**Ground-Based Experimental Testing**

- Low-Speed Wind-Up Turn
- Full scale flight geometry
- Dynamic, maneuvering flight
- Dynamic structural/system response
- Environmental effects
- Engine power effects

Data from numerical simulation of the dynamic maneuver fed into CFD-based flight simulation, then proof-of-match between flight simulation and flight experience

* Potential flight test vehicle configuration