Version 2
August 20, 2024

Slides 6 and 7 updated for static temperature of 271 K (487.8 R)

DPW-8 & AePW-4

Buffet Working Group

July 16, 2024

aiaabuffet@gmail.com

Working Group and Subgroup Leadership Team

- **Buffet Working Group Leadership**
- **Hadar Ben-Gida** IL
  Technion Israel Institute of Technology
- **Brent Pomeroy** US
  NASA Langley
- **Daniella Raveh** IL
  Technion Israel Institute of Technology
- **Andrea Sansica** JP
  JAXA Chofu Aerospace Center
- **Bret Stanford** US
  NASA Langley Research Center

- **Subgroup Leadership**
- **Jeff Housman** US
  Hybrid RANS/LES
  NASA Ames Research Center
- **Johan Jansson** SE
  Wall-Modeled LES
  KTH Royal Institute of Technology
- **Fulvio Sartor** FR
  URANS
  ONERA Centre de Meudon
- **Leaders from five countries and three continents**

Website Information

Buffet Working Group website
https://aiaa-dpw.larc.nasa.gov/WorkingGroups/Group3/group3.html

Geometry website
https://aiaa-dpw.larc.nasa.gov/geometry.html

Grid website
https://aiaa-dpw.larc.nasa.gov/grids.html

Postprocessing website (including ONERA OAT15A experimental results)
https://aiaa-dpw.larc.nasa.gov/postprocessing.html

Large File Upload (please upload as a zip file with your name in the file name and alert the buffet email address)
https://nasagov.app.box.com/f/fd164563283b4e85857d1a0975b0b363

RANS Committee-Supplied Grids Status

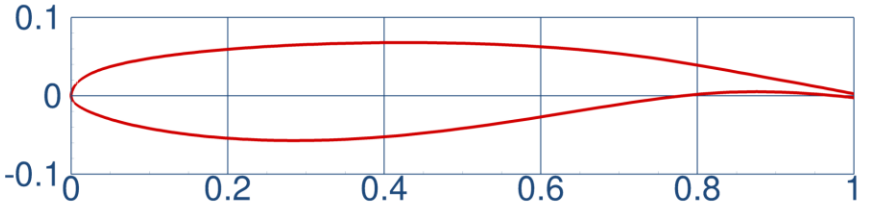
- **The ONERA OAT15A RANS committee-supplied grids are complete**
  - These are intended to be RANS grids
  - Grids are all one cell wide
  - New grids will be necessary for alternate schemes (not committee supplied)
- **Participants are strongly encouraged, but not required to use these supplied grids for RANS simulations**
- **RANS gridding guidelines have been posted to the grids website (v3, July 1)**
  https://aiaa-dpw.larc.nasa.gov/grids.html
- **A link to the server hosting the grids is available on the grids website**
- **Grid partner updates (see slides at the end of this document)**
  - Helden Aerospace (HeldenMesh)
  - Cadence (Pointwise)
  - NASA Ames (Chimera Grid Tools), in work

Subgroup Interest

- **Many questions exist regarding best practices for unsteady schemes and grids**
- **Provided grids are using previously-established RANS best practices**
  - A need exists to develop/refine grid best practices
  - Detailed discussions within subgroups will be valuable
  - We will begin starting off-week groups by scheme (once per month)
- **Subgroup leaders**
  - URANS: Fulvio Sartor, ONERA Centre de Meudon fulvio.sartor@onera.fr
  - Hybrid RANS/LES: Jeff Housman, NASA Ames jeffrey.a.housman@nasa.gov
  - WMLES: Johan Jansson, KTH jjan@kth.se
  - LES: You?
- **Email the Subgroup leader If you are interested in participating**
- **Individuals are welcome to attend these meetings and not submit data**

Test Case 1a: Workshop-Wide Validation

Jaquin, et al. "Experimental Study of Shock Oscillation over a Transonic Supercritical Profiles." AIAA Journal, Vol. 47, No. 9, 2009. Pages 1985-1994

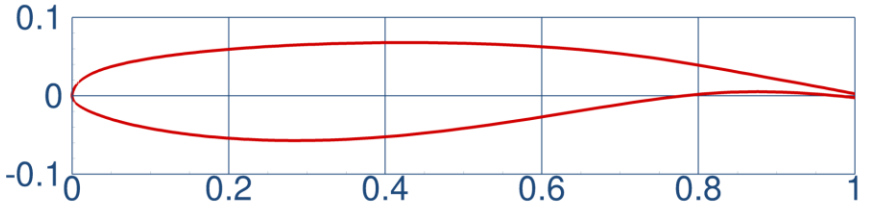


ONERA OAT15A Transonic Airfoil

- **Validation of steady CFD analysis, required**
- **Users are encouraged to employ best practices**
- **Settings**
  - Steady CFD (e.g., RANS)
  - Prefer some version of SA, multiple turbulence models can be submitted
  - Purely 2D simulations (one cell wide)
- **Grids**
  - Six-member grid family; four are required, six are desirable
  - Encourage use of committee-supplied grids; user-generated grids are acceptable
  - RANS grid characteristics: 230mm chord (same as experiment) and one cell wide
- **Conditions**
  - Mach 0.73, Re_c=3m (based on chord length), T_{static}= 271 K (487.8 R)
  - Alpha: 1.36, 1.50, 2.50, 3.00, 3.10, Buffet WG supplement: 3.25, 3.40, 3.50, 3.60, 3.90

Test Case 1b: Buffet Working Group Supplement

Jaquin, et al. "Experimental Study of Shock Oscillation over a Transonic Supercritical Profiles." AIAA Journal, Vol. 47, No. 9, 2009. Pages 1985-1994



ONERA OAT15A Transonic Airfoil

- **Validation of unsteady CFD analysis, required**
- **Users are encouraged to employ best practices**
- **Settings**
  - Unsteady CFD (e.g., URANS, DES, WMLES, LES, etc.)
  - Prefer some version of SA, multiple turbulence models can be submitted
  - Use sidewall periodic boundary conditions
- **Grids**
  - Same geometry options as Test Case 1a
  - Specialized grids for unsteady schemes will likely be generated by participants
  - Recommended cell widths for first–pass analysis: URANS, one cell wide; HRLES and WMLES will require a finite span
- **Conditions**
  - Mach 0.73, Re_c=3m (based on chord length), T_{static}= 271 K (487.8 R)
  - Alpha: 1.36, 1.50, 2.50, 3.00, 3.10, 3.25, 3.40, 3.50, 3.60, and 3.90

Data Submission for ONERA OAT15A (In Work)

- **Please follow these instructions:** https://aiaa-dpw.larc.nasa.gov/postprocessing.html
- **Case 1a**
  - Required data
    - F&M (`DPW8-AePW4_ForceMomentAveraged_v1.dat`)
    - C_P cut (`DPW8-AePW4_SectionalCutsAveraged_v1.dat`)
  - Optional data set supplement
    - Boundary layer profile data (`DPW8-AePW4_BoundaryLayerAveraged_v1.dat`)

Data Submission for ONERA OAT15A (In Work)

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  - Optional data set supplement
    - Boundary layer profile data (`DPW8-AePW4_BoundaryLayerAveraged_v1.dat`)
- **Case 1b (in work, not yet finalized/posted, but file names have been chosen)**
  - Required data
    - F&M data (both `DPW8-AePW4_ForceMomentAveraged_v1.dat` and `DPW8-AePW4_ForceMomentUnsteady_v1.dat`)
    - C_P cut data (both `AePW4_SectionalCutsAveraged_v1.dat` and `DPW8-AePW4_SectionalCutsUnsteady_v1.dat`)
  - Optional supplement
    - Boundary layer profile data (`DPW8-AePW4_BoundaryLayerAveraged_v1.dat` and/or `DPW8-AePW4_BoundaryLayerUnsteady_v1.dat`)

Additional Conversation Topics

- **Potential questions scheme-centric subgroups should address for ONERA OAT15A**
  - Effect of wake resolution and extent of increased resolution?
  - Dependence upon farfield bounding box?
  - Relationship between anisotropic and isotropic grid cells?
  - And others?
- **Spanwise extent**
  - Different schemes require varying spanwise extent
  - Relationship should be quantified, building upon prior findings in the field

Nominal Schedule

- **May, 2024**
  - ONERA OAT15A geometry release ✔
- **July, 2024**
  - ONERA OAT15A grids released ✔
  - AVIATION in-person meeting
- **August, 2024**
  - First look of Test Case 2/3 grids
- **November 30, 2024**
  - ONERA OAT15A data submission deadline (may be reconsidered)
- **January, 2025**
  - SciTech in-person meeting
  - Mini Workshop 1 (hybrid)?
- **Winter, 2025**
  - Mini Workshop 1 if not at SciTech
- **Fall, 2025**
  - Mini Workshop 2, virtual
- **March, 2026**
  - Delivery of final data set
- **June, 2026**
  - Workshop in San Diego, CA
- **Winter, 2026 (very tentative)**
  - NASA Ames 11-ft test
- **January, 2027**
  - SciTech Special Sessions in Orlando, FL

Upcoming Meetings

- **Workshop-wide meeting will occur at AVIATION on Tuesday, July 30**
  - 7:00 pm Pacific Daylight Time
  - Alliance 308
  - Hybrid
- **Next Buffet Working Group meeting is Tuesday, August 20**
  - Individuals or teams are welcome to present preliminary analysis
  - Please contact aiaabuffet@gmail.com if you are interested to present grids or solutions
  - Virtual
- **Upcoming JAXA buffet workshop**
  - Friday, August 30th, 12:30-18:00 JST
  - Contact Andrea Sansica for more information (sansica.andrea@jaxa.jp)
  - Hybrid

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