

Hover Prediction Workshop (HPW) Meeting Minutes

AIAA Aviation Conference 6/18/2020 4-5 PM

Attendees

- Rohit Jain
- Chip Jackson
- Nathan Hariharan
- Bob Narducci
- Austin Overmeyer
- Bumseok Lee
- Rajneesh Singh
- Phuriwat Anusonti-Inthra
- Yongsu
- Tom Norman
- Jim Coder
- Philippe Spalart
- Jeremy Bain
- Qiuying Zhao
- Matt Hill
- TC Wong
- Brian Wake
- James Baeder
- Peter Lorber
- BY Min
- Earl Duque
- Preston Martin
- Jared Carnes
- Juergen Rauleder
- Jennifer Abras

Minutes

- Nathan opened the meeting.
 - This is a virtual DG meeting being held during the AIAA Aviation Conference.
- Nathan introduced the committee.
- Bob put together a set of slides with the roadmap of where we are and where we are going
- Mentioned that the Scitech 2021 abstracts are in, there are currently 2 sessions planned.
- Hopefully SciTech 2021 will not be virtual, depends on how the covid situation goes
- Handed the meeting over to Bob.
- Bob thanked the attendees for past participation, help with predicting hover, and appreciates that many are unfunded but are still contributing to the workshop.
- Bob will go through the slides first, then there will be an open forum.
- There are some intro slides for people new to the workshop, then a recap of past papers from SciTech 2020.

- This leads into work for SciTech 2021 (where there are 2 sessions planned).
- We are encouraging HVAB rotor predictions, it is hoped that the test will happen in the 4th quarter of this year.
- There are resources on website to help with HVAB calculations.
- HPW background
 - Established 2011 by Nathan.
 - Vision is to bring researchers together from varied organizations worldwide to assess how we are doing with computational methods for hover problems.
- We have a website, we have many resources there, with a couple of rotors available.
- Bob went through the website.
 - Vision is on the first page.
 - A 2030 grand challenge for hover is posted.
 - Suggestions for standardizing how we present results will be on the website.
 - A couple of rotors available these are public domain which is good for global participation.
 - One of the rotors is the S76, this is about a 56 inch radius rotor.
 - The PSP rotor is also available.
 - Grids and CAD are available.
 - Abstracts of past workshops are posted. We could not post papers, but have links to the AIAA website with each abstract.
- Next was a 2030 grand challenge discussion.
 - Community focused on isolated rotor computations to begin with.
 - We had some data available for this CT, CQ, and FM.
 - Stayed here for a number of years, but we need to start looking at installed rotors since real helicopters have airframes.
 - The complexity of the challenge grows over time, interactional aerodynamics begin to be included.
 - BL transition is on the map, and has already been investigated during the workshop.
 - BL transition makes a big difference especially for small rotors.
 - Participants have also looked at elastic blades.
 - However, there is much we have not looked at yet within the group.
 - Looking at the future we want to look at multi-vehicle interactions, among other things.
 - It would be nice to get processes down that are well validated by the community so that these computations become routine.
- A number of papers were presented at SciTech 2020
 - 7 papers plus 2 presentations.
 - Papers focused on wake structure/breakdown, BL transition, and rotor installation effects.
 - Bob stepped through the papers and mentioned the key conclusions of each.
- Looking forward to papers in Nashville, TN, these range over many organizations
 - Emphasize that we look for papers that tackle any aspect of the 2030 grand challenge, if there is something being investigated that is not in there let everyone know so we can all benefit.

- Rotor test is still in planning stages and will run soon. We are waiting for this to be able to look at some of the details of our results, not just integrated quantities, to make sure we are getting the right answer for the right reason.
- The HVAB rotor was described next, information for this rotor is posted on the website
- We have been promoting HVAB for a while; however, the properties became available recently. These are now available on website.
- As a committee we decided to make suggestions on baseline parameters such as coning and lag angle.
 - Take care that these are derived from the PSP rotor. There are some differences between the PSP and HVAB, though they are very similar.
 - It is likely ok to keep using PSP geometry, but please note the differences. Especially the structural properties. If anyone wants to pursue elastic computations, please update model to use the HVAB structural properties.
- Bob showed where the files are located on the website (file share app).
- Described the availability of the test stand geometry and the NFAC facility geometry.
 - Test will be run with one section of NFAC closed, pointed out areas of tunnel on picture.
 - Tom may experiment a bit with the tunnel configuration, so data will likely be available that has more than one NFAC configuration.
- Described parameters of interest next.
 - Pressure tap locations are posted on the website.
 - Vortex trajectory and strength harder to get, but encourage people to extract those quantities.
 - Transition locations.
 - Elastic windup and other structural parameters.
 - Won't have a download to extract, but we can look at downwash at multiple locations.
 - Track CPU requirements as well so we can see how we compare as a community.
- Bob opened up the floor after finishing his slides.
- Nathan started taking questions.
 - Mentioned that we have 25 people in attendance, largest DG meeting ever.
 - Asked Tom for his thoughts on the effects of Covid on the upcoming test.
 - Tom: Covid has had an impact, there is a lot of pre-test work to do, but they are not on site, so they cannot put stuff together to do the checkout tests. Thus, hardware cannot be shipped yet. The actual test date is now uncertain, could be in October or November. It is good that no one is behind us, so a slip should be ok.
 - Nathan: Are there any funding implications for the test?
 - Tom: No, we are still planning to do everything we talked about.
 - Nathan: Even if all goes as planned now, it is too late to get the test result comparisons into SciTech 2021, but it is good for everyone to get used to the HVAB model ahead of the test data availability.
 - If there is other interest beyond what has been submitted for SciTech 2021, we can likely add papers, let Nathan know.
 - Nathan: any other questions?

- Spalart: Will simulations have entire test section and recirculation of the air modeled?
 - Bob: This is up to the researchers, this is encouraged, to quantify this effect, but it is a huge facility, so likely isn't a huge effect, the stand probably has a bigger effect.
 - Bob: Maybe at least put the floor in.
 - Tom: Mentioned that the floor is 40 feet below the rotor.
 - Tom: What is modeled is up to the researchers, the data will be available, and researchers can decide what to model.
 - Nathan: Not everyone has the resources to run the large facility effect computations.
- Nathan thanked Bob for the slides.
 - Nathan: If something missing on the website let us know, we want this as comprehensive as possible. He noted that hover is not trivial.
 - Nathan: Thanks to Alan for his contributions in starting the HPW. Thanked committee and Tom for contributions. Hopefully excellent pretest predictions at SciTech.
 - Any other questions shoot us an e-mail.
 - Bob thanked everyone.
 - Nathan adjourned the meeting.