RE: NIST points for consideration

Wereley, Steven T. to: Espina, Pedro I., Poojitha Yapa , Ira Leifer, Juan Lasheras , Ömer Savas , James J Riley, Alberto Aliseda, Paul Bommer, Mark K Sogge, Martha N Garcia

06/10/2010 11:43 AM

Cc: "Possolo, Antonio", Marcia McNutt , Bill Lehr, "Gallagher, Patrick D." , "Kimball, Kevin A.", "Boehm, Jason"

Pedro, I would agree with you that reporting two results MIGHT be unjustifiable. It depends on what we determine the difference in expected values to be and what we determine the statistical uncertainty to be. Juan and Alberto might be the best source for addressing the statistical uncertainties due to long time scale flow variation. Then there's a statistical uncertainty due to turbulent or other short time scale random processes and statistical error due to the small sample size of the PIV analysis. I was able to find an ensemble of 50 or so frames where the ROV was pretty still (basically the time period identified by Alberto in an email two days ago) and to perform PIV-based feature tracking on that ensemble. That should drive the statistical uncertainty from the PIV below the levels of the other statistical uncertainties.

Bottom line, I don't think we should push the reporting of only one flow rate at this time. We don't know enough at this point. We should certainly address the issue in our upcoming call...

We have a lot to talk about this afternoon!

Steve Wereley, Professor of Mechanical Engineering
Birck Nanotechnology Center, Room 2019, 1205 West State Street
Purdue University
West Lafayette, IN 47907
phone: 765/494-5624, fax: 765/494-0539
web page: http://engineering.purdue.edu/~wereley

From: Espina, Pedro I. [mailto:pedro.espina@nist.gov]
Sent: Thursday, June 10, 2010 11:20 AM
To: Wereley, Steven T.; Poojitha Yapa; Ira Leifer; Juan Lasheras; Ömer Savas; James J Riley; Alberto Aliseda; Paul Bommer; Mark K Sogge; Martha N Garcia
Cc: Possolo, Antonio; Marcia McNutt; Bill Lehr; Gallagher, Patrick D.; Kimball, Kevin A.; Boehm, Jason
Subject: Re: NIST points for consideration

Steve,

Your observations are well taken. Our point is that reporting two results might be statistically unjustifiable. Thus, we recommend the reporting of only one result.

Pedro

On 6/10/10 11:08 AM, "Wereley, Steven T." <wereley@purdue.edu> wrote:
Pedro, your thinking is correct for statistical errors but not for systematic or bias errors. For instance,

we use GORs ranging from 0.25 to 0.5. If we used the wrong value to calculate the pre-cut flow then we also used the wrong value in the post-cut flow. Another systematic issue is how the turbulent structures that we track relate to the average velocity of the jet or plume. Most of us have assumed a value between 1.5 and 2.0 for this relationship. While this value can change with Reynolds number and plume configuration, you can figure that a major portion of that variation is systematic. What this tells us is that we need to be more careful about separating random and systematic uncertainties. Certainly we will have considerable statistical uncertainties but the bulk of our uncertainty range is systematic.

From conversations with many of the plume team members over the last days, I think most of us would like our individual reports compiled into the group report and then the plume team group report made publically available. We should discuss this further in the telecon.

Best,

Steve Wereley, Professor of Mechanical Engineering
Birck Nanotechnology Center, Room 2019, 1205 West State Street
Purdue University
West Lafayette, IN 47907
phone: 765/494-5624, fax: 765/494-0539
web page: http://engineering.purdue.edu/~wereley

From: Espina, Pedro I. [mailto:pedro.espina@nist.gov]
Sent: Thursday, June 10, 2010 10:58 AM
To: Poojitha Yapa; Ira Leifer; Juan Lasheras; Ömer Savas; James J Riley; Alberto Aliseda; Paul Bommer; Wereley, Steven T.; Mark K Sogge; Martha N Garcia
Cc: Possolo, Antonio; Marcia McNutt; Bill Lehr; Gallagher, Patrick D.; Kimball, Kevin A.; Boehm, Jason
Subject: NIST points for consideration
Importance: High

Colleagues,

We would like you to consider a few things prior to our conversation this afternoon.

1. You all have reported confidence in your results that ranges from about 20% to 50%. That means that a difference between your pre- and post- cut-off results will only be statistically significant if the flow increased by more than that confidence interval as a consequence of the cut.
2. Given the uncertainty of the methodology that you are using, there is about an equal chance that any difference that you see in pre- and post- cut-off results is due to the cleaner geometry and video than due to a real change in flow.
3. Due to 1 & 2, it is statistically unjustifiable to report two results (i.e., pre- and post- cut-off). In other words, your two sets of results may be identical within your ability to make these measurements.

Finally,

- We suggest that the reports from all members of the Plume Team be made available to the public (e.g., via a website). We believe that this will enhance the credibility of the joint result

from the group.

Pedro

Pedro I. Espina, Ph.D.
Program Analyst
Program Office, Office of the Director
Tel: +1 301 975 5444

Pedro I. Espina, Ph.D.
Program Analyst
Program Office, Office of the Director
Tel: +1 301 975 5444