AIR Development Update: AIR-902A

SAE A-21 Meeting – Cologne, Germany

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USDOT Volpe Center
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U.S. Department of Transportation
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- "Determination of Minimum Distance from Ground Observer to Aircraft for Acoustic Tests"
- Scope:
  - This document describes a practical system to determine the observer-to-aircraft closest point of approach (CPA) distance during acoustic flyby tests. The system uses a digital camera to record an image of the test aircraft. A method converting the image to a CPA dimension is presented. Potential sources of errors are discussed.

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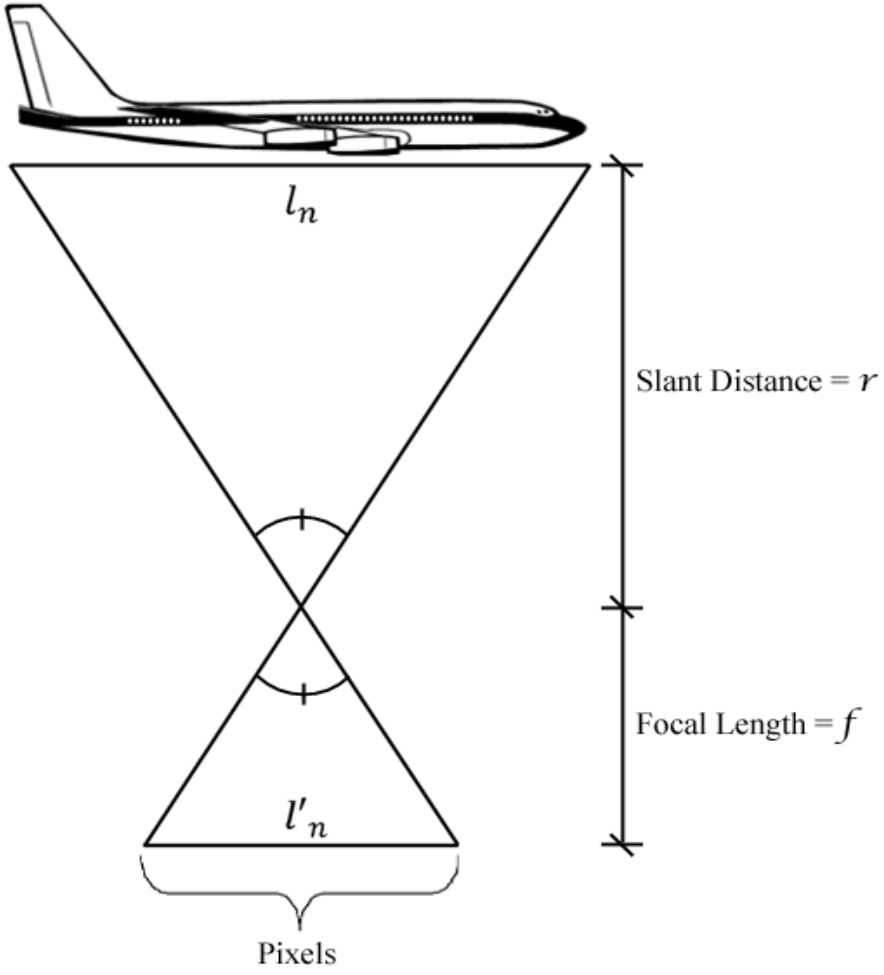

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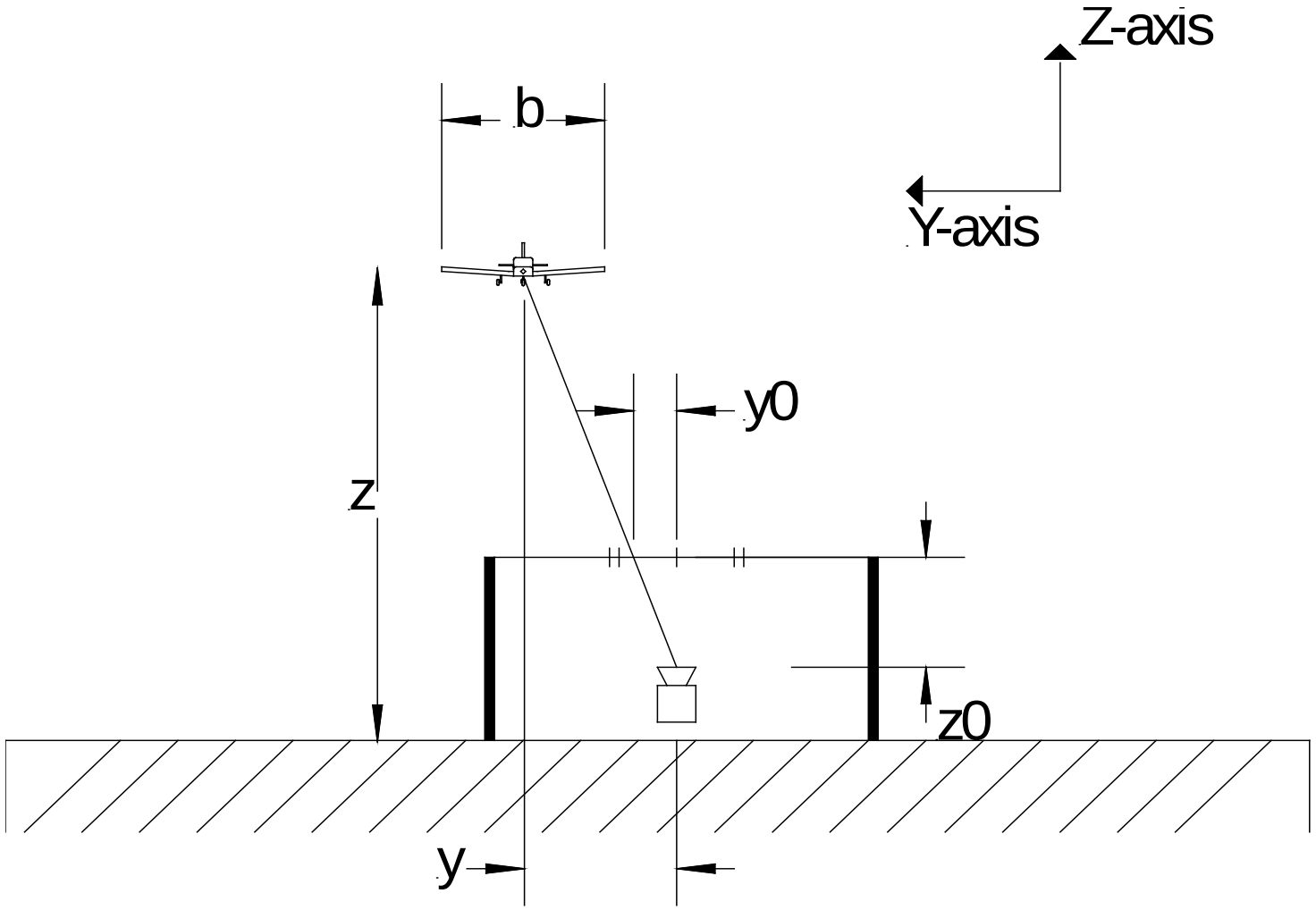

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- But what do you do if you can't get underneath the aircraft?
- At a recent NASA UAS test, we had to shoot from an offset
- The process still works, but requires knowing the pitch angle of the camera, and assigning angles to the image's pixels

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- Basic premise of 902A is that of similar triangles
  - The focal length of the camera is related to the slant distance to the aircraft
  - Slant distance is calculated from the known aircraft dimensions, the measured image dimensions, and the known focal length of the lens/camera system.
- But similar triangles also have, by definition, similar angles
  - For the off-set camera, we can use the known camera angle and the angle for the center of the image to determine the angle from the camera to the aircraft
- So an offset camera can determine the slant distance, but can also determine the components of the slant distance (if the angles are known)
  - Components are the altitude above the camera and the ground distance

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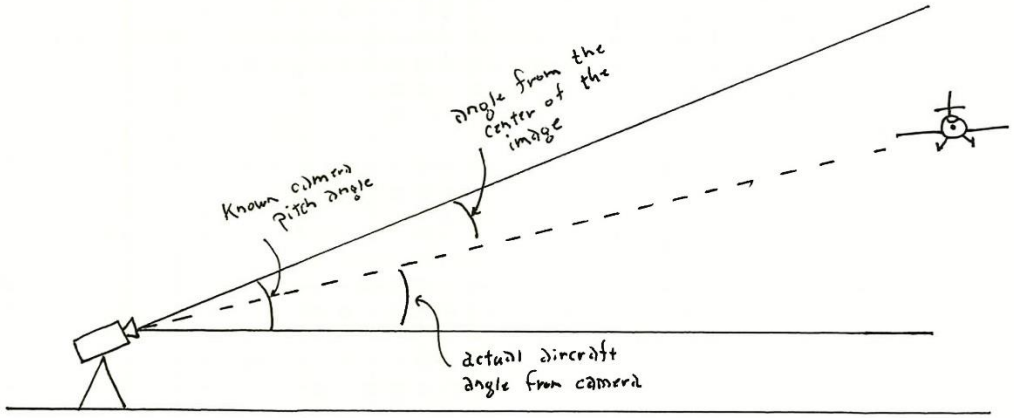
angle from the center of the image
Known camera pitch angle
actual aircraft angle from camera

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- Questions for the group:
  - Is this worth pursuing?
  - Should we add this to the standard?
  - If so, do we treat it at the same level as the standard under-the-track method?

Questions?

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