Parameter matrix of the acoustic camera (obtained from calibration) from which the focal lengths (in pixels) are obtained:

$$Ac = \begin{bmatrix} FL_x & \gamma & u_0 \\ 0 & FL_y & v_0 \\ 0 & 0 & 1 \end{bmatrix} = \begin{bmatrix} 644.9019 & 0 & 240.6257 \\ 0 & 634.2610 & 400.1048 \\ 0 & 0 & 1 \end{bmatrix}$$

Where FLx is the focal length in x-direction, FLy the focal length in y-direction, γ is the skew coefficient, $u0$ the 1st coordinate of the principal point and $v0$ the 2nd coordinate of the principal point.

The height (H) of the aircraft can then be calculated using

$$H = FL_y \frac{wing\ span_m}{wing\ span_n} = FL_y dY.$$

Where $wing\ span_m$ is the wing span in meters and $wing\ span_n$ is the wing span in pixels.

The pixel to meter ratio in x-direction can be calculated using

$$dX = \frac{H}{FL_x}.$$

The aircraft velocity can be calculated by the displacement of the aircraft over the pictures taken with the camera:

$$V = \frac{\sqrt{dX^2 + dY^2}}{dt}.$$

Here dt is the number of frames used divided by the frame rate. In the table below you can find the specifications and settings of the acoustical camera.

Item	Value
Specifications	
Manufacturer and model	Datavision UI-1220LE
Lens	Kowa LM4NCL
USB cable length	5m
Resolution	752x480
Max frame rate	87 Hz
Settings	
Frame rate	30 Hz
Exposure time	0.1 ms
Image dimension	480x752
Bits	8

In the table below are the values of wing span for the file you need to process.

File name	Wing span [meters]
2017-10-17_10-46-21	34
2017-10-17_10-50-19	26
2017-10-17_10-54-49	28.7
2017-10-17_10-58-10	34

2017-10-17_11-00-03	28.7