

Aspect Ratio Measurement

July 5, 2006

Aspect ratio refers to the relative magnification vertically compared to horizontally. We assume it is 1, but there can be errors that cause the image to appear longer horizontally (aspect ratio < 1) or longer vertically (aspect ratio > 1). Two common causes are

- the introduction of a ill-defined surface in the optical path – cuvettes are a common culprit
- incorrect timing setup in the frame grabber – grabber does not match camera timing.

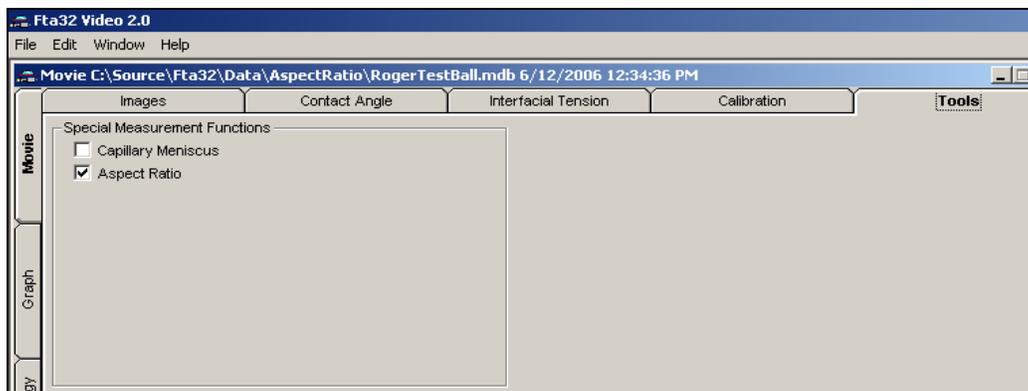
Issues with frame grabber setup have been addressed in the past:

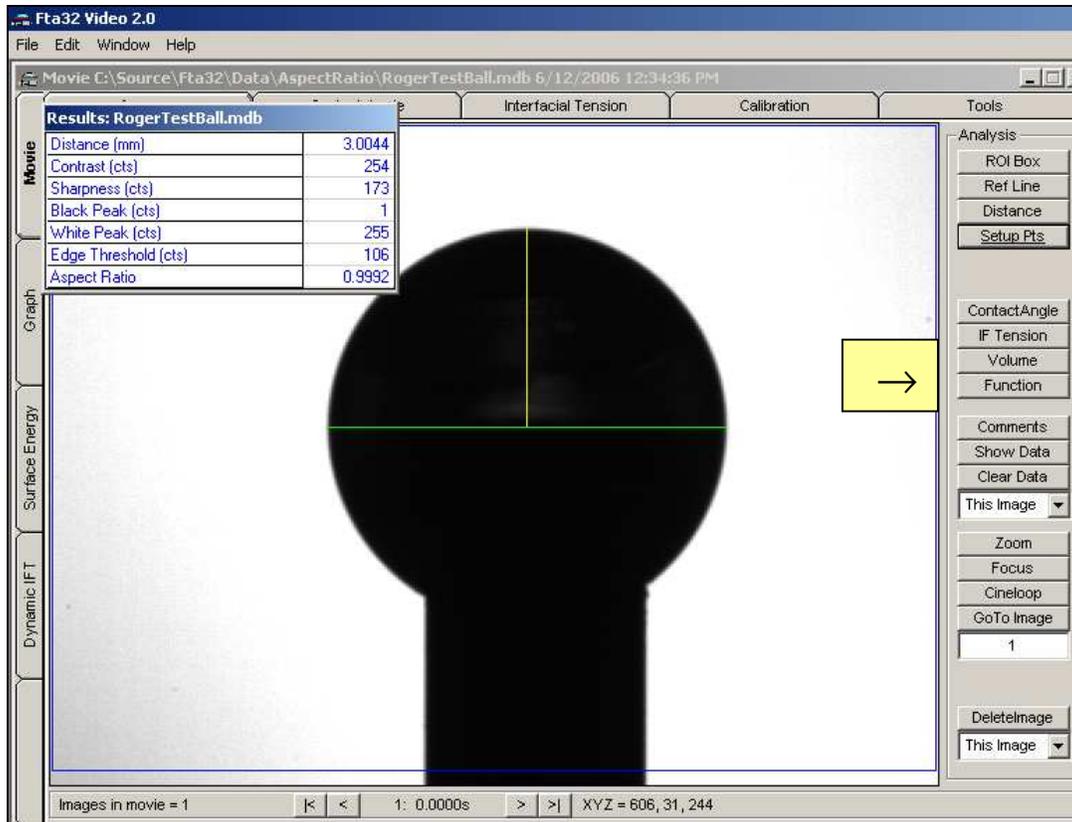
<http://www.firsttenangstroms.com/faq/SoYouWant728.html>

Frame grabber setup is normally correct. However, if you can not obtain a reasonable value for the interfacial tension of water using the pendant (hanging) drop method, you should consider aspect ratio and the other factors discussed in the above reference. If you can obtain a good IFT measurement on a pendant drop, but can not when the drop is inside a cuvette, consider the possibility that the cuvette wall has distorted the image in one direction and not the other. This will leave the aspect ratio incorrect. Plastic cuvettes are particularly troublesome.

Measuring Aspect Ratio

A direct aspect ratio measurement function was introduced in Build 254. To use it, take a SnapShot of a sapphire or stainless steel ball and select Aspect Ratio on the Movie | Tools tab





Click *Function*. You selected the Aspect Ratio function on Tools.

This particular image has a measured aspect ratio of 0.9992. This is displayed in the Results box. The diameter of the ball is 3.0044 millimeters. The green line shows the diameter and the yellow perpendicular line shows the extent in the direction away from the supporting rod. The rod, or point of support, needs to be either above or below the sphere.

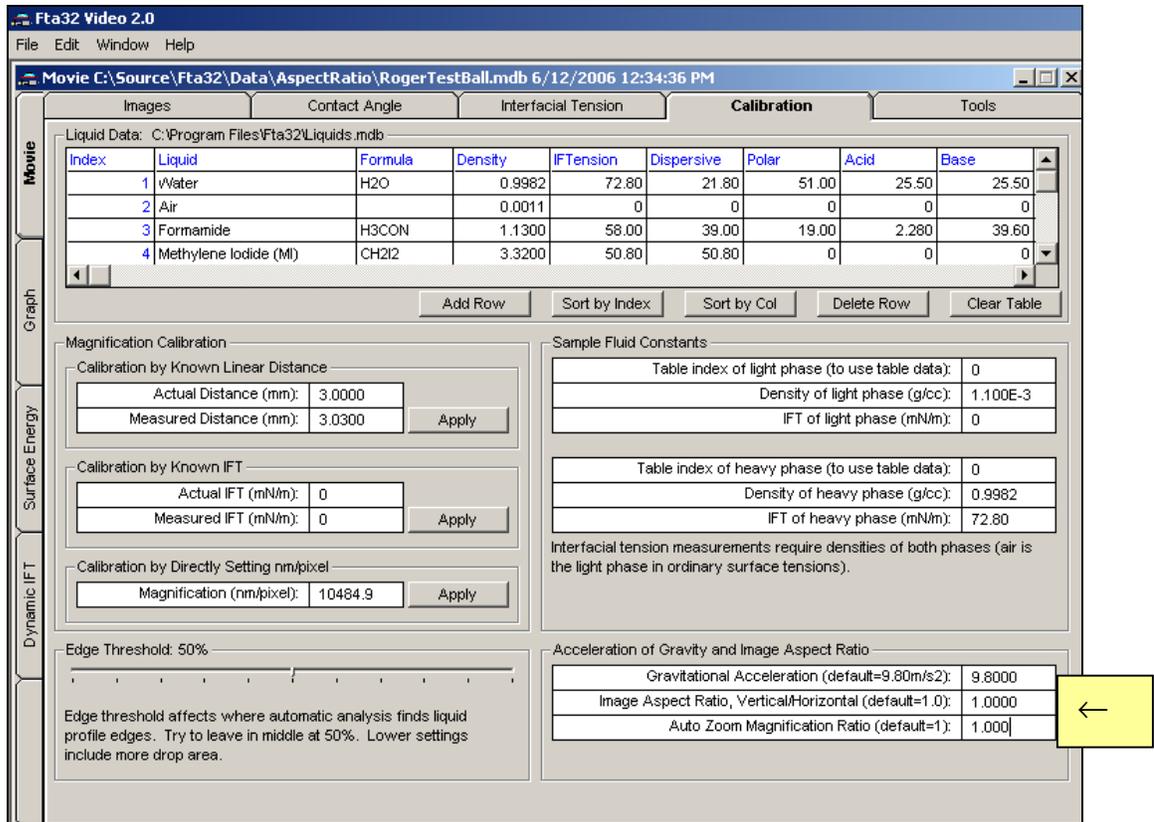
How Good is Good Enough?

On a practical basis, aspect ratio can be measured with this technique to 1 part in 1000. The two biggest uncertainties are the ball itself and the image processing measurement. Notice the target can be measured all the way across in the horizontal direction but only one half of it can be measured in the vertical direction because the ball must be supported. This is one of the complicating issues.

Unless you have additional information, we suggest that measured values between 0.999 and 1.001 be treated as 1.

Using a Measured Aspect Ratio

You can enter your aspect ratio in the Calibration tab of any Movie. It will then be used by this and any subsequent Movie you take.



Enter desired aspect ratio here.

Differential Measurement of Aspect Ratio

The limitations of the direct measurement can be overcome by a differential measurement when we have a situation like a cuvette.

1. Measure the aspect ratio with a spherical ball and no cuvette in place and record its value. Change nothing in the program.
2. Measure the aspect ratio with the same ball inside the cuvette. Divide this new aspect ratio by the previous (no cuvette) aspect ratio. The result is the effective (differential) aspect ratio and should be entered on the Calibration tab *when the cuvette is in use*, but not otherwise.

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