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UCRL-TR-236587

# PDV Probe Alignment Technique

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November 15, 2007

This work performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344.

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# PDV Probe Alignment Technique

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This alignment technique was developed while performing heterodyne velocimetry measurements at LLNL. There are a few minor items needed, such as a white card with aperture in center, visible alignment laser, IR back reflection meter, and a microscope to view the bridge surface.

The work was performed on KCP flyers that were 6 and 8 mils wide. The probes used were Oz Optics manufactured with focal distances of 42mm and 26mm. Both probes provide a spot size of approximately 80µm at 1550nm. The 42mm probes were specified to provide an internal back reflection of -35 to -40dB, and the probe back reflections were measured to be -37dB and -33dB. The 26mm probes were specified as -30dB and both measured -30.5dB.

The probe is initially aligned normal to the flyer/bridge surface. This provides a very high return signal, up to -2dB, due to the bridge reflectivity. A white card with a hole in the center as an aperture can be used to check the reflected beam position relative to the probe and launch beam, and the alignment laser spot centered on the bridge, see Figure 1 and Figure 2. The IR back reflection meter is used to measure the dB return from the probe and surface, and a white card or similar object is inserted between the probe and surface to block surface reflection. It may take several iterations between the visible alignment laser and the IR back reflection meter to complete this alignment procedure. Once aligned normal to the surface, the probe should be tilted to position the visible alignment beam as shown in Figure 3, and the flyer should be translated in the X and Y axis to reposition the alignment beam onto the flyer as shown in Figure 4.

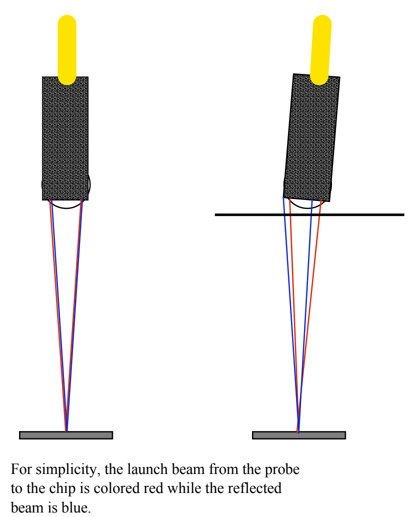


Figure 1. Probe tilt alignment

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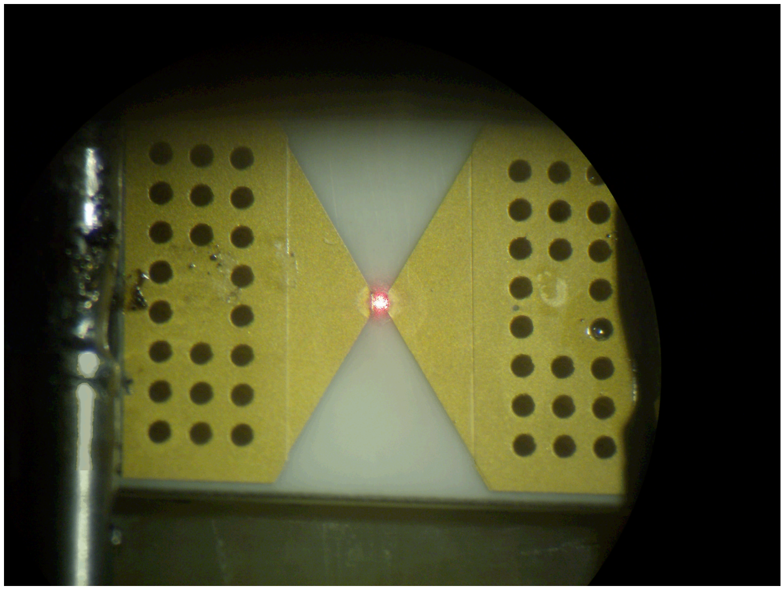

Figure 2. Laser beam alignment on bridge, viewed through microscope.

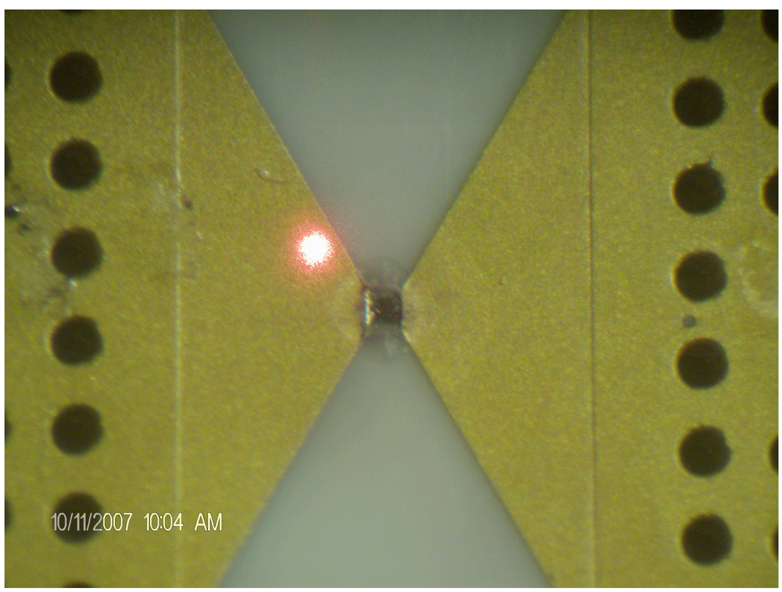


Figure 3. Probe tilted to point alignment beam away from bridge.

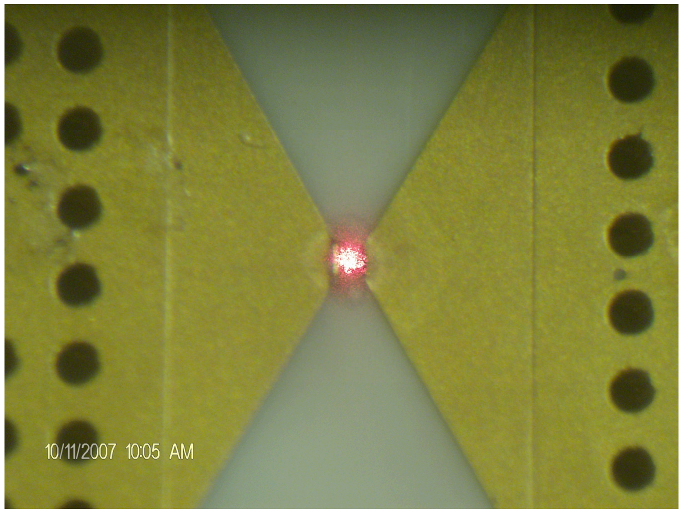


Figure 4. Chip translated in X and Y directions as needed to re-align to bridge.

This tilting of the probe minimizes the amount of light from the bridge reflection into the fiber within the probe while maintaining the alignment as near normal to the flyer surface as possible. When the back reflection is measured after the tilt adjustment, the level should be about -3dB to -6dB higher than the probes' specified back reflection. This 3 to 6dB increase in back reflection from the surface relative to the probes' specified back reflection is the optimal level for acquiring data from the flyer. Data obtained with the LLNL system is shown in Figure 5.

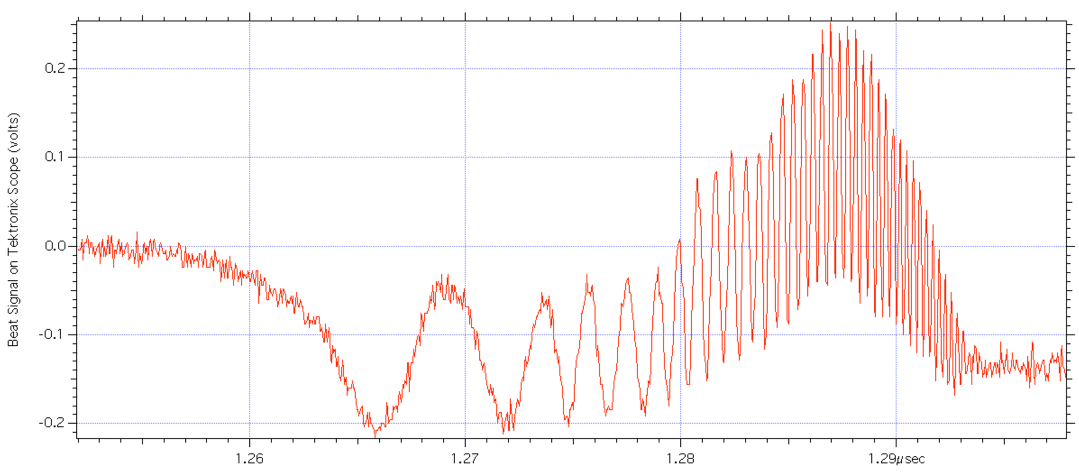


Figure 5. 8mil flyer data obtained on Tektronix scope.