

# CAVITY INSPECTION USING RADIAL METROLOGY

by

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## Abstract

Radial metrology is a process devised to study the inner surfaces of cavities found, for example, inside pipes, tubes, and boreholes, using a unique panoramic annular lens (PAL).<sup>1</sup> When a 38 mm (1.5") diameter PAL is positioned within a cavity a view of the cavity interior, extending from approximately fifty-three degrees off the lens axis to about eighty-six degrees off-axis and encompassing a full 360 degree surround of the axis, is mapped into a flat annular image. Figure 1, for example, shows the image obtained when a PAL is positioned along the axis of a cylindrical pipe, the interior surface of which is covered with a test pattern. The depth of field extends from the surface of the PAL out to infinity. Since the central portion of the PAL is not used for imaging, a conventional lens can be glued to its surface for forward viewing.

This paper will review some of the methods previously developed for profiling cavities using laser scanning techniques,<sup>2,3</sup> speckle photography,<sup>4,5</sup> and holographic interferometry.<sup>6,7</sup> Computer algorithms for detecting anomalies, digitally correlating images, and linearizing the annular images obtained from the PAL will be discussed. The presentation will conclude with a description of some of the steps currently being taken to develop compact and rugged probes for applications ranging from large scale measurements on space hardware to endoscopic inspections within the human body.

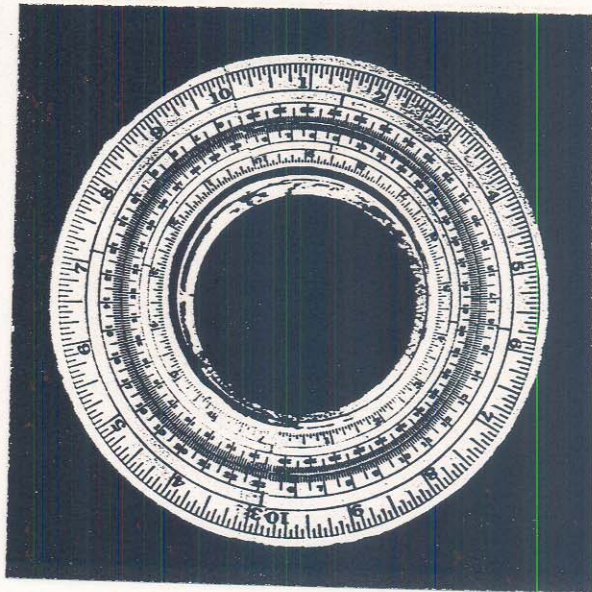


Figure 1. Image obtained when a PAL is positioned along the axis of a cylindrical pipe, the interior surface of which is covered with a test pattern.

## References

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