

# **Nondestructive Contactless Characterization of an Internal Surface of Transparent Shells**

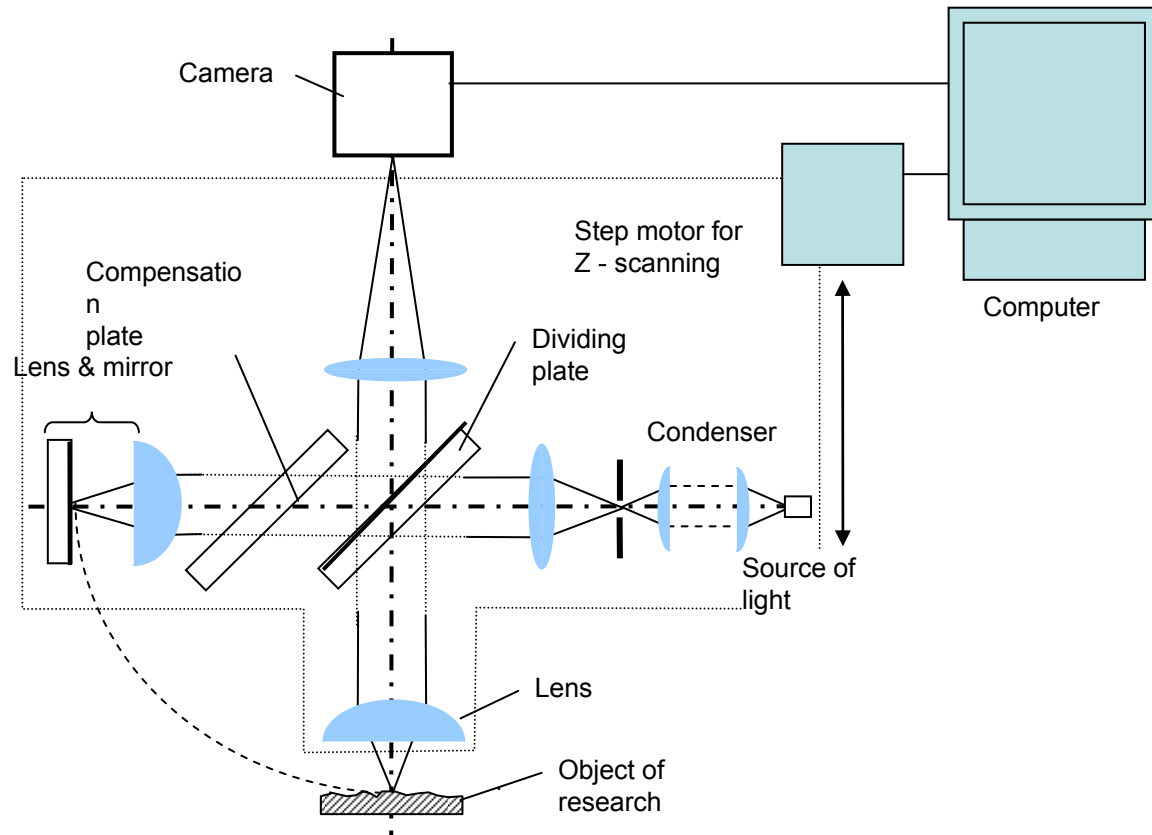
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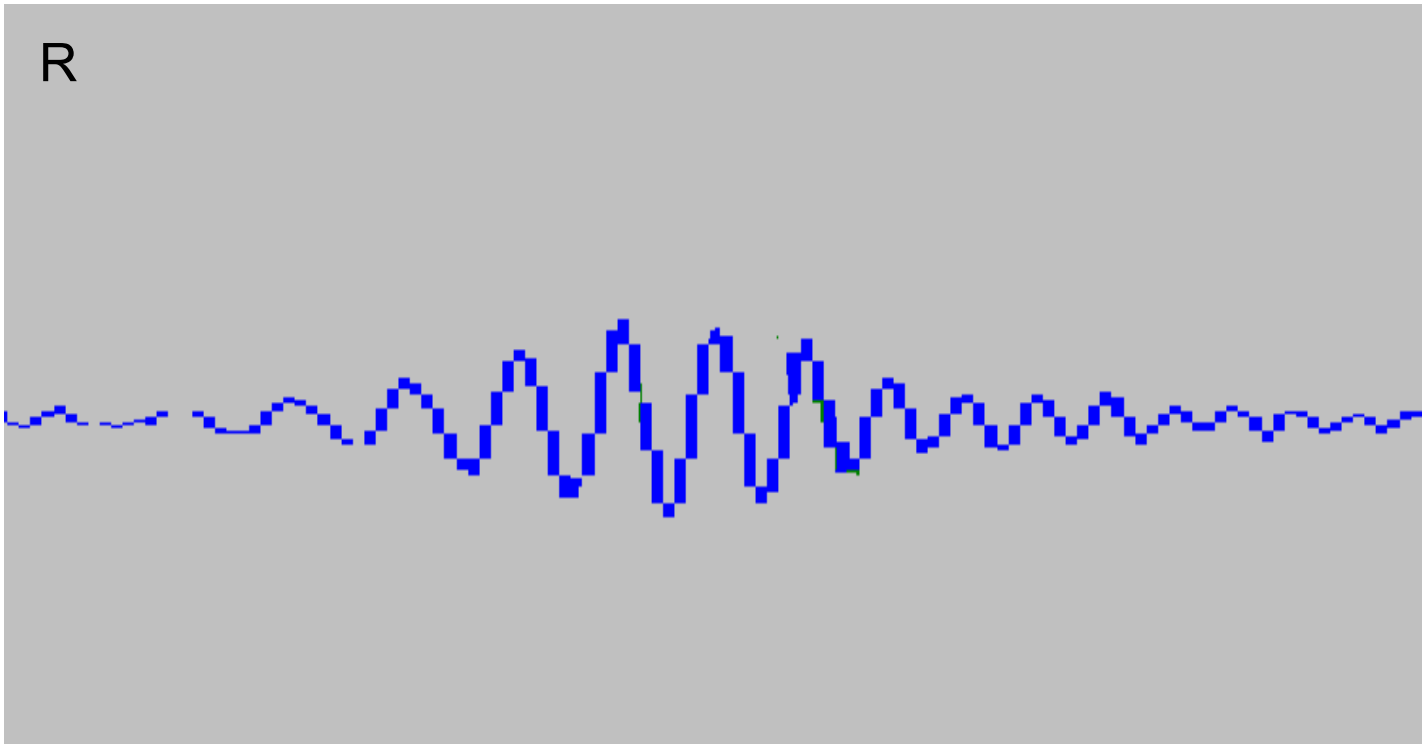
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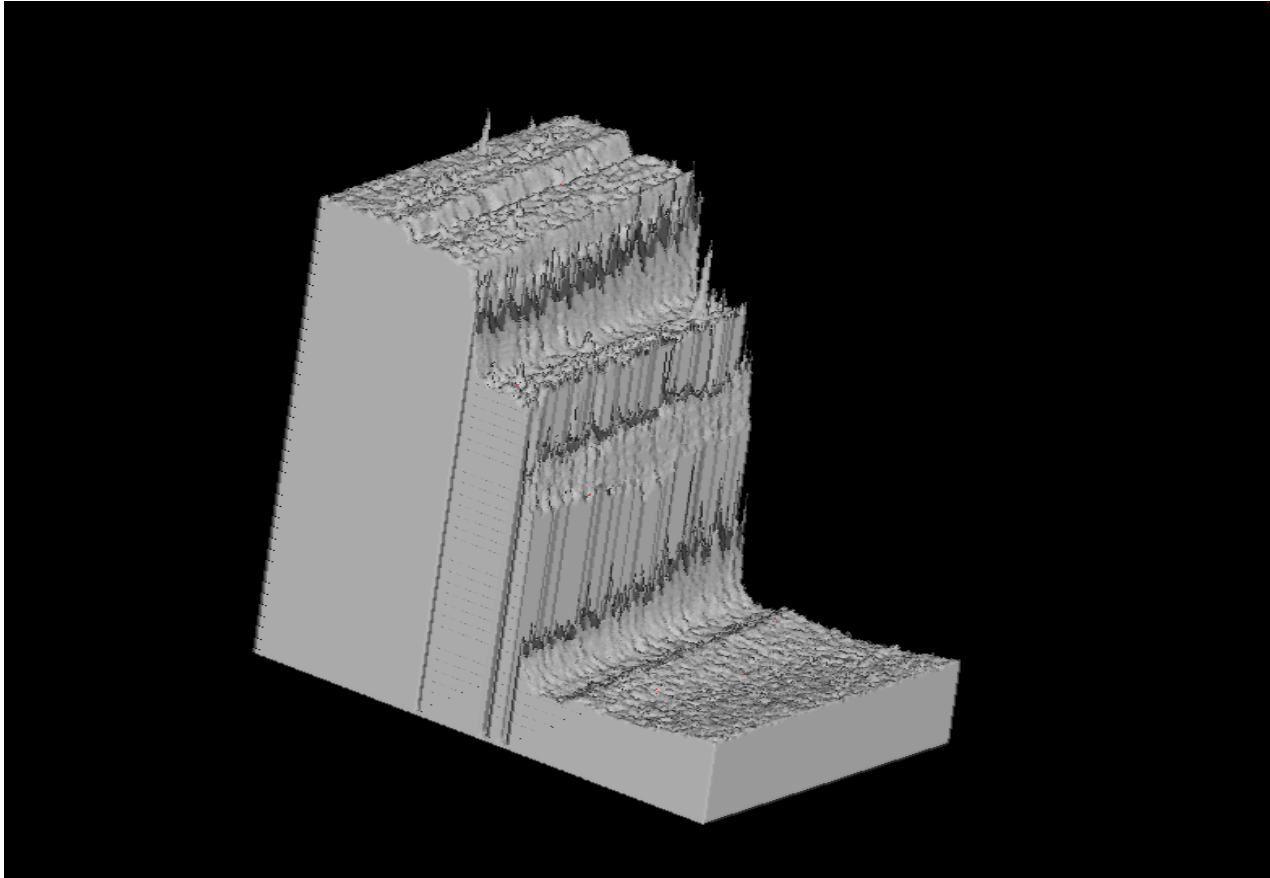
# Scanning interferometer on the Linnik interferometer basis MII-4



# Pixel interferometer signal



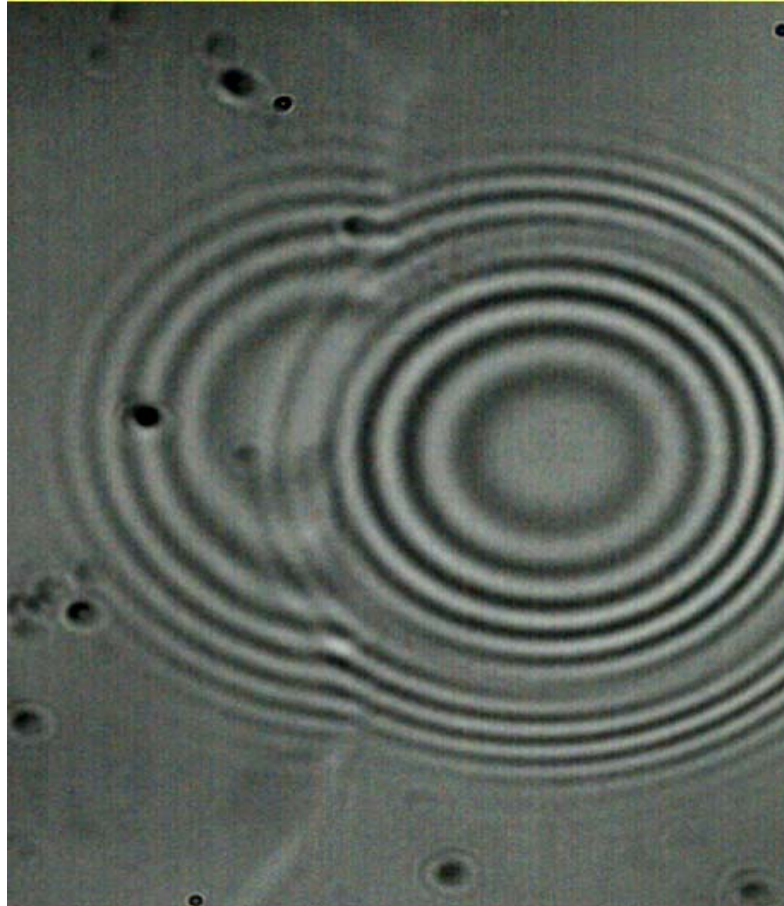
# Height surface measurement



Multi step surface

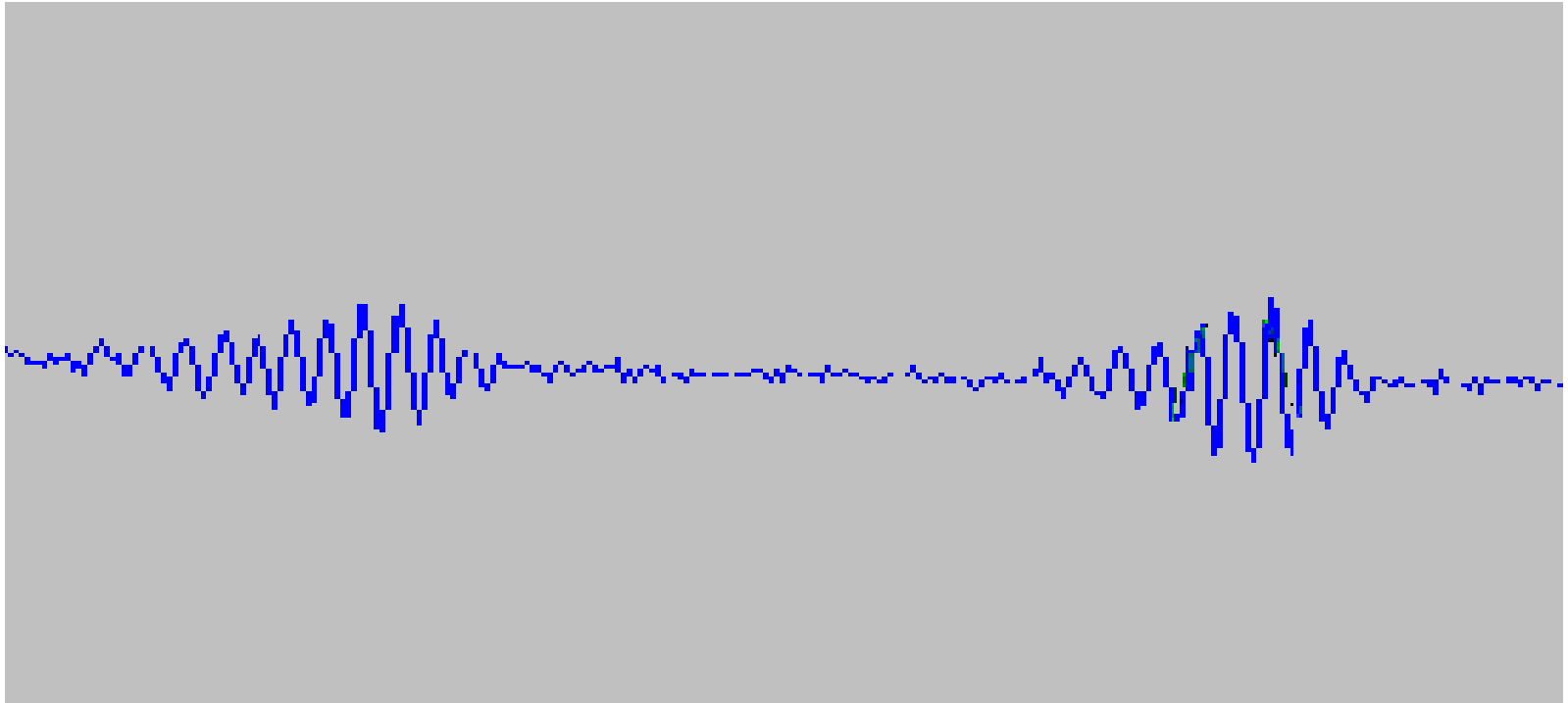
Accuracy 0.1  $\mu\text{m}$

## Transparent object

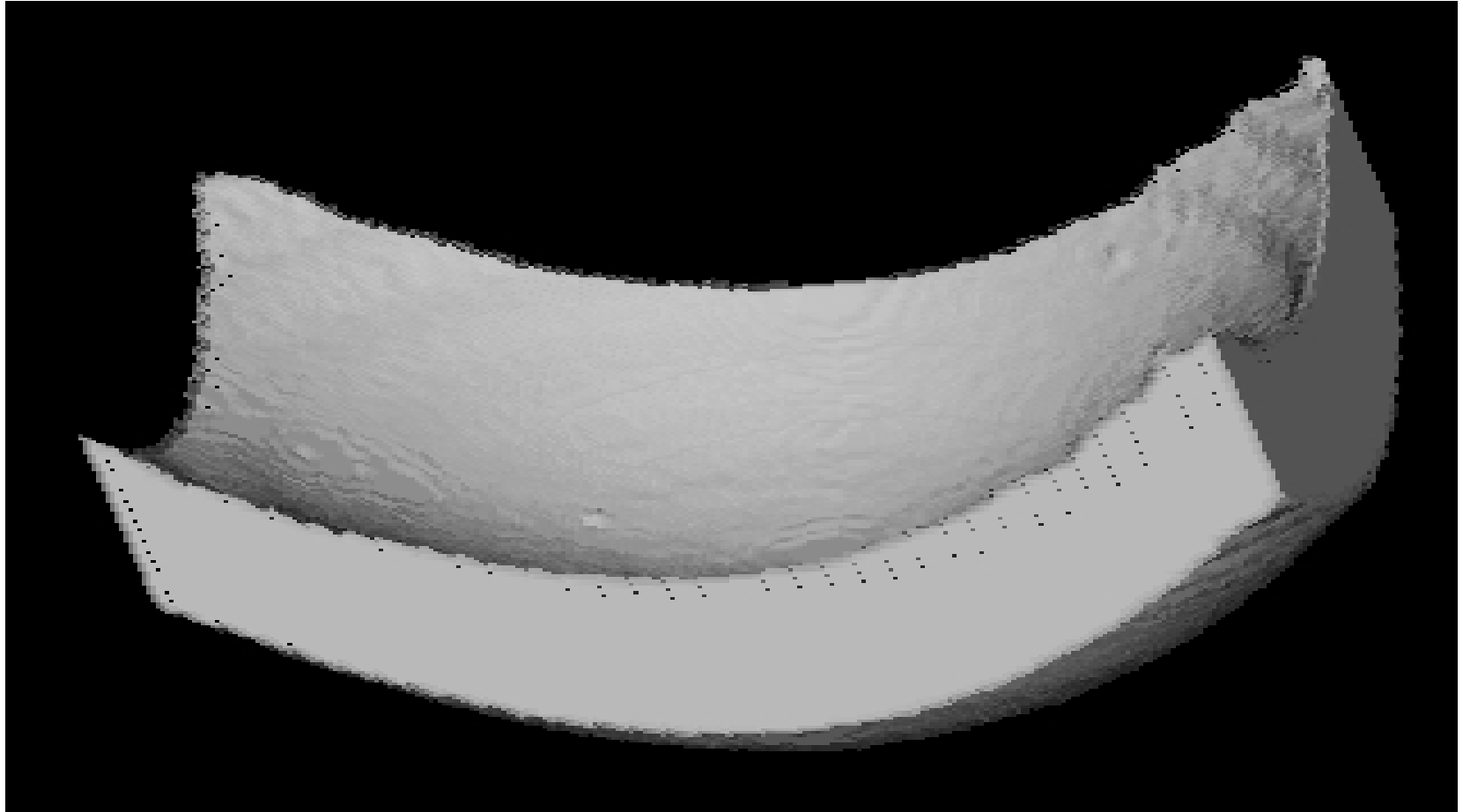


Frame of a shell with oil

# Pixel interferometer signal for shell



## Reconstructed shell surfaces( $100\mu\text{m} * 100\mu\text{m}$ )



# Results

<b>N</b>	<b>D <math>\mu\text{m}</math></b>	<b><math>\Delta</math> <math>\mu\text{m}</math></b>	<b>R<sub>in</sub> <math>\mu\text{m}</math></b>	<b><math>\sigma_{in}</math> <math>\mu\text{m}</math></b>	<b>R<sub>out</sub> <math>\mu\text{m}</math></b>	<b><math>\sigma_{out}</math> <math>\mu\text{m}</math></b>
<b>1</b>	<b>230</b>	<b>4.9</b>	<b>113</b>	<b>0.005</b>	<b>118</b>	<b>0.03</b>
<b>2</b>	<b>240</b>	<b>7.7</b>	<b>115</b>	<b>0.003</b>	<b>123</b>	<b>0.01</b>
<b>3</b>	<b>280</b>	<b>11.4</b>	<b>133.5</b>	<b>0.002</b>	<b>144</b>	<b>0.01</b>

The difference between sphere centers of inner and outer surfaces was less than 0.2  $\mu\text{m}$ .



# Conclusion

- It is possible to reconstruct outer and inner transparent shell surfaces;
- Device is able to calculate radii, centers and roughness of shell surfaces.
- Further device improvement will be able to increase the number of parameters to be measured.



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