# APPLICATION OF A POINT-DIFFRACTION INTERFEROMETER TO UNSTEADY SHOCK WAVE PHENOMENA

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**KEYWORDS**:
**Main subjects**: unsteady shock wave phenomenon, flow visualization
**Fluid:** high speed flows, flows with shocks
**Visualization method(s):** point-diffraction interferometer
**Other keywords:** interferometer,

**ABSTRACT**: To clarify an effectiveness of a point-diffraction interferometer (PDI) [1, 2, 3, 4] as a method to visualize unsteady shock wave phenomena, we developed simple pinhole setup and tried to visualize a propagation process of a spherical shock wave induced by an $AgN_3$ explosion by using PDI and shadowgraph method, and recorded visualization images sequentially by using a high-speed digital video camera (Shimadzu Hyper-Vision, HPV-1). A continuous cw green laser (COMPASS 315M-50, COHERENT Inc., wavelength: 532 nm, output power: 50 mw) was used as a light source. The frame interval and the exposure time of video recording were 2 μs and 500 ns, respectively. Firstly, we applied the PDI method to visualization of a heated solder as a test of our PDI setup. Fringe image of thermal convection around the heated solder was clearly visualized as shown in Fig. 1. Secondly, we applied the PDI method to visualization of the unsteady shock wave phenomena. Figure 2 shows visualization images of a spherical shock wave induced by an $AgN_3$ explosion. A left picture of Fig. 2 is the PDI image, and a right picture of Fig. 2 is the shadowgraph image, respectively. By using the PDI method, the density contours caused by the $AgN_3$ explosion were clearly visualized as a fringe pattern. Additionally, from sequential images of the PDI visualization, a process of a propagation of the spherical shock wave caused by the $AgN_3$ explosion was clarified.

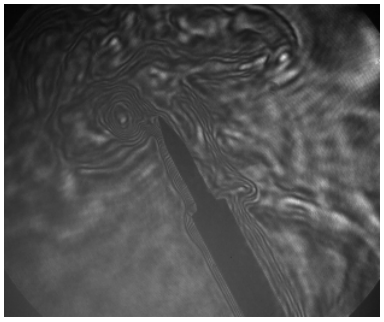

Fig. 1 Visualization image of rising warm air around a solder by using PDI method

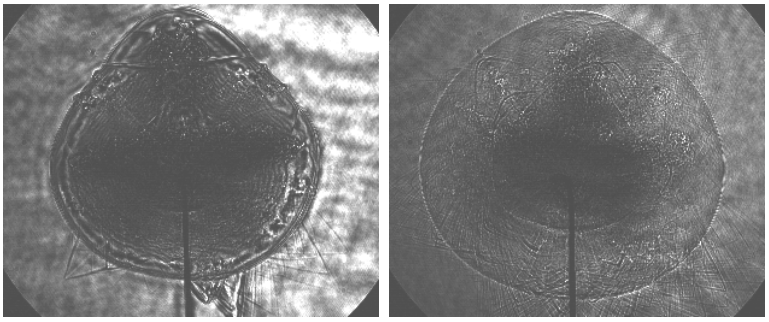

Fig. 2 Visualization images of spherical shock wave induced by an $AgN_3$ explosion by using PDI method (left), and shadowgraph method (right)

## References

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