

# Three-dimensional rainbow schlieren measurements in underexpanded sonic jets from axisymmetric convergent nozzles

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# STRUCTURE OF UNDEREXPANDED SUPERSONIC JETS FROM AXISYMMETRIC LAVAL NOZZLES

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Issue	Issue Date	Page	Volume	Page
2019	Issue A	APPLICATION OF WENO-JTPM3 INTERPOLATION FOR TWO-DIMENSIONAL SHOCKS	Calculated Results, Authors Discusses, Numerical Methods	3-16

**Abstract** A shock-fractionation system combined with a high-speed camera is applied for a shock train in a constant-area straight duct to clarify its unsteady characteristics, in which just upstream of the shock train the freestream Mach number is 1.66, the unit Reynolds number is  $1.71 \times 10^5 \text{ m}^{-1}$ , and the boundary layer thickness is 0.412 mm. A pseudosymmetrical two-dimensional density field in the shock train is quantitatively obtained with high-speed visualization. The present shock-fractionation system is found to be effective for unsteady density measurements in shock-dissipated flows in a two-dimensional duct. The oscillatory characteristic of each shock in the shock train is demonstrated by power spectral analysis of the unsteady density field.

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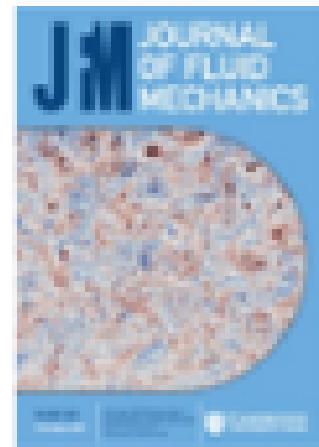
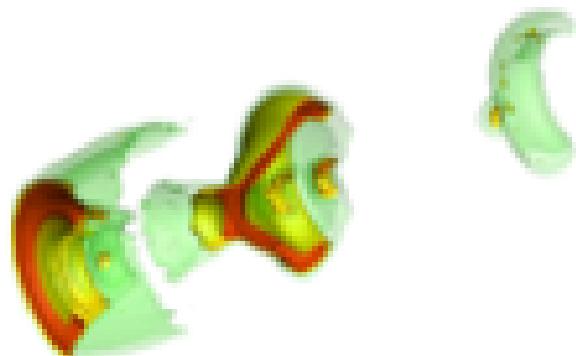
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Shota Yoshimi<sup>1</sup>, Takahiro Yamashita<sup>1</sup>, Shinichiro Nakao<sup>1</sup>, Yoshiaki Miyazato<sup>1</sup> &

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