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Speckle imaging of a circuit breaker arc near current-zero PATRICK STOLLER, RAPHAEL FÄRBER, EMMANOUIL PANOUSIS, MICHAEL SCHWINNE, ABB Switzerland Ltd. — Optical speckle imaging can be used to determine quantitatively the temperature and density distribution in an axially symmetric gas flow by measuring the gradient of the index of refraction. This technique was applied to studying the properties of a high current arc embedded in a supersonic flow as the current approaches a zero-crossing. Such conditions play an important role in high voltage gas circuit breakers, where an arc is drawn between two contacts and axially blown to interrupt a current. A simple test device designed to reproduce the key features of a circuit breaker while allowing easy access for optical measurements was used. The arc was blown axially with synthetic air. Nozzles equipped with glass windows were used to permit speckle imaging of the flow; measurements were also carried out at the exit of the nozzle. The decaying phase of the high current arc was extended artificially by injecting a low DC current. Density and temperature information calculated from speckle images was coupled with arc voltage and current measurements and compared to CFD calculations to gain a better understanding of arc dynamics during the current-zero phase.

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