Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Probing the breakup of high-speed liquid jet by ultrafast x-ray microimaging.[1] JIN WANG, Argonne National Laboratory — High-pressure high-speed sprays have vast industrial and consumer applications that penetrate to very aspect of the society. Despite their longstanding multitude of uses, the fundamental physics that governs the spray flow formation in high-speed jets is not well understood. Experimentally, the difficulty is due, in large part, to a lack of information about the composition of spray plumes close to the nozzle, such as liquid breakup mechanism and spray mass distribution. Traditional visualization tools like visible-light-based imaging have not been effective. To date, theoretical and computational studies of the sprays have proven to be extremely difficult, if not impossible, to carry out. We report here the development of x-ray-based microimaging technique to visualize the breakup of optically opaque high-speed jets in the near-nozzle region. The quantitative near-nozzle spray characteristics can serve to validate primary liquid breakup models and be used as indispensable initial and boundary conditions for spray atomization processes in further downstream areas.

[1]This work and use of the Advanced Photon Source were supported by the U. S. Department of Energy, Office of Science, Office of Basic Energy Sciences, under Contract No. DE-AC02-06CH11357.

Jin Wang
Argonne National Laboratory

Date submitted: 22 Nov 2006 Electronic form version 1.4