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Velocity and size distribution measurement of suspension droplets using PDPA technique SHAHIN AMIRI, ALI AKBARNOZARI, CHRISTIAN MOREAU, ALI DOLATABADI, Concordia University — The creation of fine and uniform droplets from a bulk of liquid is a vital process in a variety of engineering applications, such as atomization in suspension plasma spray (SPS) in which the submicron coating materials are injected to the plasma gas through the suspension droplets. The size and velocity of these droplets has a great impact on the interaction of the suspension with the gas flow emanating from a plasma torch and can consequently affect the mechanical and chemical properties of the resultant coatings. In the current study, an aqueous suspension of small glass particles (2-8 μm) was atomized by utilizing an effervescent atomizer of 1 mm orifice diameter which involves bubbling gas (air) directly into the liquid stream. The gas to liquid ratio (GLR) was kept constant at 6% throughout this study. The mass concentration of glass particles varied in the range between 0.5 to 5% in order to investigate the effect of suspension viscosity and surface tension on the droplet characteristics, such as velocity and size distributions. These characteristics were simultaneously measured by using a non-intrusive optical technique, Phase Doppler Particle Anemometry (PDPA), which is based on the light signal scattered from the droplets moving in a measurement volume. The velocity and size distribution of suspension droplets were finally compared to those of distilled water under identical conditions. The results showed a different atomization behaviors due to the reduction in surface tension of the suspension spray.

Ali Akbarnozari
Concordia University

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