

CFD Modeling and Flow Visualization in Cold Spray Process

Dr. Ali Dolatabadi

Concordia University

The two-phase particle laden flow is computationally modeled and compared with the data obtained from the experiments, determining the achievable degree of consistency. A two-way coupled Lagrangian scheme along with the RSM turbulence model is used to track the particles and to model the interactions between the gas and the particulate phase. The effect of particle loading on the structure of shock and expansion waves is investigated. In addition, the effect of water injection in the high pressure chamber of a cold spray nozzle is analyzed. Water spray with a droplet size of 10-100 μm is modeled using both uniform and Rosin-Rammler size distributions. The two-phase flow of gas-liquid is modeled using an unsteady discrete phase mass source with two-way coupling with the main gas flow. As a result, the proper droplet size distribution with a fully evaporative spray can be used as a carrier of nano-particles in cold spray nozzles.