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Powder Under Compression; 3.7.1 Constitutive Function; 3.7.2 Yield Function and Property Estimations; 3.8 Consolidation Parameters of GDS and Shear Compression; 3.8.1 Estimation of Compaction Parameters; 3.8.1.1 GDS Experiments; 3.8.1.2 Shear Compaction Modeling; 3.9 Modeling Results and Discussion; 3.9.1 ASB Width Evaluation; 3.9.2 Yield Stress of Powder Material; 3.10 Concluding Remarks; 4 Low-Pressure GDS System; 4.1 State-of-the-Art Cold Spray Systems; 4.2 State-of-the-Art Powder Feeding Systems
4.3 Modification of the Low-Pressure Portable GDS System4.4 An Industrial Low-Pressure Portable GDS System; 5 General Analysis of Low-Pressure GDS; 5.1 Statement of Problem; 5.2 Experimental Procedure; 5.3 Experimental Results; 5.3.1 Deposition Efficiency; 5.3.2 The Effect of the Particle Mass Flow Rate; 5.3.3 The Build-up Parameter; 5.3.4 Structure and Properties; 5.4 Basic Mechanisms; 5.5 Concluding Remarks; 6 Diagnostics of Spray Parameters: Characterization of the Powder-Laden Jet; 6.1 General Relationships; 6.1.1 The Governing Equations of Single-Phase Turbulent Flow
6.1.2 The k- Model for Turbulent Flows6.1.3 Particle Dynamics in Gas Flow; 6.2 Gas Flow and Particle Acceleration; 6.2.1 Computational Fluid Dynamics (CFD); 6.2.2 An Engineering Model with Particle Friction; 6.3 Calculated Data and Discussion; 6.3.1 Simulation of Gas-Particle Flow in the Nozzle; 6.3.2 Influence of Gas Pressure; 6.3.3 Effects of Particle Concentration; 6.3.4 Effects of Nozzle Wall Friction; 6.4 Free Jet Characterization; 6.4.1 Shock Wave Features of the Jet; 6.4.2 An Engineering Model of the Free Jet; 6.4.3 Particle Flow Structure Within the Normal Shock Region
6.4.4 Particle Collisions

Sommario/riassunto

Written by the inventor of the Gas Dynamic Spray (GDS) technique, this first monograph on the topic brings the understanding of the GDS coating formation process to a new qualitative nanostructural level, while introducing it to industrial and technological experts so that they can develop a new generation of coatings materials. Representing the results of over ten years of research in the field, the material discussed here covers nearly every aspect of the physical principles and applications of the GDS process, including topics in applied solid state physics, materials science, nanotechn