Mechanical Properties of Thermally Sprayed Ceramic-Metallic Materials

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Current knowledge of thermally sprayed cermets is mostly limited to surface-level properties, and existing studies focus on these materials as thin coatings, where the physical volume is negligible[1]. Therefore, this talk investigates the mechanical properties of these, but fabricates them thick enough to be considered bulk material**.** This study specifically focuses on evaluating and analyzing the stress-strain behavior of those materials as well as strain-rate dependence. The methodology employs a dual-testing approach to assess the mechanical properties of the cermet using distinct procedures. A hydraulic testing machine was used to perform quasi-static compression tests to determine the material's properties under low-strain-rate loading. Additionally, dynamic compression experiments were conducted using a Split-Hopkinson Pressure Bar (SHPB), a well-established method for testing materials under high-strain-rate conditions[2]. Cylindrical specimens with a diameter of 6 mm and a height of 3 mm were used for experimental testing. The results show a strong strain-rate sensitivity, with the flow stress of the ceramic-metallic composite increasing significantly under dynamic loading compared to quasi-static conditions. In this paper, the results presented provide a novel qualitative and quantitative analysis of the mechanical properties of these materials in bulk form, providing important data on their response under both static and dynamic testing conditions, which is crucial for applications.

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