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Johnson-Cook Strength Model for Automotive Steels K. VEDANTAM, D. BAJAJ, N.S. BRAR, Mechanical and Aerospace Engineering and Research Institue, University of Dayton, Dayton, OH 45469 — Over the last few years most automotive companies are engaged in performing simulations of the capability of individual components or entire structure of a motor vehicle to adequately sustain the shock (impacts) and to protect the occupants from injuries during crashes. These simulations require constitutive material models (e.g., Johnson-Cook) of the sheet steel and other components based on the compression/tension data obtained in a series of tests performed at quasi-static ($\sim$1/s) to high strain rates ($\sim$2000/s). One such study is undertaken by the recently formed IISI (International Iron and Steel Institute) in organizing the round robin tests to compare the tensile data generated at our Laboratory at strain rates of $\sim$1/s, $\sim$300/s, $\sim$800/s, and $\sim$2000/s on two grades of automotive steel (Mild steel and Dual Phase-DP 590) using split Hopkinson bar with those generated at high strain rate testing facilities in Germany and Japan. Our tension data on mild steel (flow stress $\sim$ 500 MPa) suggest a relatively small strain rate sensitivity of the material. The second steel grade (DP-590) tested exhibits significant strain rate sensitivity in that the flow stress increases from about 700 MPa (at $\sim$1/s) to 900 MPa (at $\sim$2000/s). J-C strength model constants (A, B, n, and C) for the two steel grades will be presented.

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