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Wed-Af-Po3.25-03 [107]: Numerical simulation of drawing process of multi-filamentary MgB2 wire

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In the drawing process, a non-uniform powder distribution in the MgB2 wire along longitudinal direction can cause degradation of superconducting properties of MgB2 wire and strain hardening of sheath material. It may finally results in breakage of wire due to a stress concentration at locally deformed region in sheath materials. In this study, numerical simulation of drawing process of multi-filamentary MgB2 wire was conducted to predict densification behaviour of powder and deformation behaviour of sheath materials during the drawing process. In the simulation, powder was modelled by a modified Drucker-Prager Cap (DPC) model and commercial finite element software ABAQUS was used to implement the modified DPC model. The calibration of the material parameters for the modified DPC model was performed by extracting the data from the combination of cold isostatic pressing (CIP) and die compaction tests. The initial shape and material properties of multi-filamentary wire in the simulation was modelled based on the experimental results. The predicted density of powder and deformed shape of wire were compared with experimental results to verify simulation results.

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