

## **Prediction of flow stress of Nb40Ti60 alloy in hot deformation**

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The Cu/Nb/NbTi multilayered sheets are produced by consecutive process of hot and cold rolling, the final structure and superconducting properties of the composite are provided by multiple heat treatments introduced between the rolling operations. The hot deformation behavior of pure copper and niobium are relatively well known [1], [2] but a very limited number of literatures are available for the niobium alloys [3]. The flow stress of Nb60Ti40 alloy was investigated by Instron material testing machine at elevated temperature range 500-1000 °C and strain rate varied between 0.001 and 1 s<sup>-1</sup>. It was observed that the flow stress increases with increasing strain rate and decreasing temperature. The constitutive equation for high temperature was established, and it was applied in the finite element modelling for analyzing the hot deformation characteristics of niobium alloy.

*Keywords: hot deformation, flow stress, niobium-titanium alloy, temperature and strain-rate sensitivity*

### **References:**

- [1] R.-L. Zhao, Yecheng Liu, B.-H., Tian, X.-W. Zhang, Y. Zhang: High temperature deformation behavior of pure copper, Jinshu Rechuli/Heat Treatment of Metals 36(8), 2011, p.17-20
- [2] A. N. Behera, R. Kapoor, A. Sarkar, J. K. Chakravartty: Hot deformation behavior of niobium in temperature range 700–1500°C, Materials Science and Technology 30(6), 2014, p. 637-644
- [3] A. Sarkar, R. Kapoor, A. Verma, J. K. Chakravartty, A. K. Suri: 'Hot deformation behavior of Nb-1Zr-0.1C alloy in the temperature range 700–1700 °C, J. Nucl. Mater. 422, (1–3), 2012, p.1–7.