**Integrated JC-ZA Constitutive Model Development for Flow Stress Prediction of Inconel 625 Alloy**

**C. Anand Badrish**

BITS Pilani, Hyderabad Campus, Hyderabad, India

*nitink@hyderabad.bits-pilani.ac.in*

**Ayush Morchhale1, Nitin Kotkunde1\*, Swadesh Kumar Singh2**

1BITS Pilani, Hyderabad Campus, Hyderabad, India

2GRIET, Hyderabad, India

**ABSTRACT**

This paper interprets experimental and numerical study of flow stress behavior of Inconel 625 alloy at elevated temperatures using uniaxial tensile tests. The integrated model combines the yield and strain hardening portion of the Jhonson-Cook (JC) model with the temperature and strain rate portion of Zerilli-Armstrong (ZA) model. Isothermal uniaxial tensile tests have been performed on Inconel 625 alloy from room temperature to 7000C at an interval of 1000C with low strain rates (0.0001 *s-1*, 0.001 *s-1*, 0.01 *s-1*). Interpretation of experimental results reveals that flow stress is significantly influenced by change in temperature than the strain rate. The integrated *(JC-ZA)*model has been established based on experimental tensile test results. The appropriateness of integrated *(JC-ZA)* model has been authenticated with various statistical parameter. The accuracy of the developed model is exhibited by using various statistical measures such as standard deviation (*δ*), avg. absolute percentage error (*Δ*) and correlation coefficient (*R*).The forecast values shows good agreement with experimental flow stress data. Competence of the model is verified using Finite Element (FE) analysis of tensile test using ABAQUS software. The user defined subroutine code has been developed. FE results also shows accurate prediction of flow stress behavior.

*Keywords: Inconel625,Tensile Testing, Flow Stress, Constitutive Modeling*