PREFACE

In this work a strain-time relationship has been evolved on the basis of strengthening of metals during creep deformation. As an evidence of strengthening during creep it has been cited though the external parameters viz., composition, temperature and stress, remain unaltered, the rate of creep deformation as well as the rate of recovery which overcomes work hardening, decrease with increase of time during the primary creep. During this period the internal stress increases and the effective stress i.e. the difference between stress induced by an externally applied load and the internal stress, decreases. The parameters strain rate, rate of recovery, internal stress and effective stress attain a limiting value by the end of this period. Relationships among these parameters have been used to work out the strain-time relationship. Two fcc metals Nickel and Aluminium have been tested with the creep tester designed, fabricated and calibrated for this work. The results obtained have been analysed to substantiate the strain-time relationship.

In the first chapter the genesis of the present problem has been given, reported along with this is a review

of the relevant literature. In this section because of the large number of equations used by various authors those equations which have not been used in the subsequent portion have not been assigned equation numbers.

In the second chapter the topics which are dealt with are the basic tools used in this research. These include a theoretical analysis, the design, fabrication and calibration of the creep tester used in this work. A strain-time relationship has been derived from which the creep equations used by others may also be obtained.

The results of the tests performed have been given in the third chapter. These results consist of the data obtained directly from the measurements as well as the same obtained by numerical analysis of the measured parameters.

The last chapter gives the analysis of the results, relationships. The effect of stress on the rate of recovery has been looked into. A comparision of the fit of the data into the various creep equations have been made. Conclusions based on these results as well as suggestions for further work have been included at the end of this chapter.