Effects of Microstructural Parameters on Creep of Nickel-Base Superalloy Single Crystals (Paperback)



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Reviews

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EFFECTS OF MICROSTRUCTURAL PARAMETERS ON CREEP OF NICKEL-BASE SUPERALLOY SINGLE CRYSTALS (PAPERBACK)



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Bibliogov, United States, 2013. Paperback. Condition: New. Language: English . Brand New Book ***** Print on Demand *****. Microstructuresensitive creep models have been developed for Ni-base superalloy single crystals. Creep rupture testing was conducted on fourteen single crystal alloys at two applied stress levels at each of two temperatures, 982 and 1093 C. The variation in creep lives among the different alloys could be explained with regression models containing relatively few microstructural parameters. At 982 C, gamma-gamma prime lattice mismatch, gamma prime volume fraction, and initial gamma prime size were statistically significant in explaining the creep rupture lives. At 1093 C, only lattice mismatch and gamma prime volume fraction were significant. These models could explain from 84 to 94 percent of the variation in creep lives, depending on test condition. Longer creep lives were associated with alloys having more negative lattice mismatch, lower gamma prime volume fractions, and finer gamma prime sizes. The gamma-gamma prime lattice mismatch exhibited the strongest influence of all the microstructural parameters at both temperatures. Although a majority of the alloys in this study were stable with respect to topologically close packed (TCP) phases, it appeared that up to approximately 2 vol TCP phase did not affect the 1093 C creep lives under applied stresses that produced lives of approximately 200 to 300 h. In contrast, TCP phase contents of approximately 2 vol were detrimental at lower applied stresses where creep lives were longer. A regression model was also developed for the as-heat treated initial gamma prime size; this model showed that gamma prime solvus temperature, gamma-gamma prime lattice mismatch, and bulk Re content were all statistically significant.

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