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Simulation Studies of Solid-Particle and Liquid-Drop Erosion of NiAl Alloy

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Abstract : This article presents modeling studies of NiAl alloy under solid-particle erosion and liquid-drop erosion. In the solid particle erosion simulation, attention is paid to the oxide scale thickness variation on the alloy in high-temperature erosion environments. The erosion damage is assumed to be deformation wear and cutting wear mechanisms, incorporating the influence of the oxide scale on the eroded surface; thus the instantaneous oxide thickness is the result of synergetic effect of erosion and oxidation. For liquid-drop erosion, special interest is in investigating the effects of drop velocity and drop size on the damage of the target surface. The models of impact stress wave, mean depth of penetration, and maximum depth of erosion rate (Max DER) are employed to develop various maps for NiAl alloy, including target thickness vs. drop size (diameter), rate of mean depth of penetration (MDRP) vs. drop impact velocity, and damage threshold velocity (DTV) vs. drop size.

Keywords : liquid-drop erosion, NiAl alloy, oxide scale thickness, solid-particle erosion
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