Southern University

Development of Continuum Thermo-Mechanical Analyses Models and Micro-Scale Models for in Service Performance Studies of YSZ Thermal Barrier Coatings (TBC)

This research is an investigation on the in-situ thermo-mechanical performance of TBCs by as a function of the thickness of coating layers, properties, and simultaneously increasing the operating temperature. Micro-scale effects due to formation of thermally grown oxide layer and radiative heat transfer within the semi-translucent TBC layer due to thermal energy exchange with the combustion gases is also considered. The above thermal boundary value problem is modeled and solved numerically using a commercial computational fluid dynamics and heat transfer software. In service thermal stress analysis study will be undertaken for novel macro-cracked TBCs that have not been characterized. An analytical approached will be developed, in addition to solution by numerical method such as using FLUENT CFD and ABAQUS FEA software.