# INTERFACE ANALYSIS OF COHESIVE-FRICTIONAL MATERIALS

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In this paper we examine the interaction of normal and tangential damage in cohesive interface elements for thermomechanical degradation analysis of concrete and geomaterials. After a brief discussion of coupling effects on the conditioning of the underlying constitutive relations, we will address two topics:

(a) Interaction Effects in Thermomechanical Damage:
In the first part of the presentation we explore the formulation of thermal and mechanical damage at the interface level of observation, when thermal softening is interacting with mechanical degradation. To this end we will contrast two damage models which will illustrate the interaction of normal and tangential mechanical response and their effect on thermomechanical damage.

(b) Nonlinear Response of Heterogeneous Materials under Thermal Sweep:
In the second part of the presentation we consider thermal effects in heterogeneous composites with applications to concrete materials when thermal mismatch and spalling may lead to massive degradation of their load resistance.

**References**

[1] Willam, K., Rhee, I. and Shing, B., (2002), "Interface Damage Model for Thermomechanical Degradation of Heterogeneous Materials", accepted for publication in Special Issue of CMAME on Computational Failure Mechanics.