

## ICAMS Special Seminar

Tuesday, 9 January

2:00 p.m.

Room IC FW 02/718

**Dr. Evgeny Pogorelov**

### **Use of J-integral and phase-field model for study of crack propagation in composites**

The fundamental basis of today's understanding of the phenomenon fracture traces back to Griffith, who realized that the growth of cracks is determined by a competition of a release of elastic energy and a simultaneous increase of the surface energy due to the advancing crack. J integral is the contour path integral, independent of the path around crack, and one of the best ways to calculate strain energy release rate, avoiding high inaccuracy in stress calculations within crack tip.

In last decades phase field theory based on energy global potential was adopted to satisfy Griffith criterion, moreover it can resolve such problems as crack branching, crack path, crack coalescence within one uniform modeling frame. In the framework of phase-field modelling, the dynamic of crack propagation in layered composite will be presented. Also classical J-integral calculation for prediction of the start of crack growth in layered ceramic-polymer composite will be shown in comparison with experimental data. Finally, the derivation of degradation theory based on correct multi crack interaction and crack coalescence in homogeneous medium based on the phase-field multi crack calculations will be discussed.

Generalized for phase-field approach J integral method can be good tool even in case of multi crack computations.