"Material Resistance against Ductile Tearing Crack Propagation in Mild Steels"

Friday, January 25, 2:30 pm
Pickard Hall, Room 304

Dr. Ping Jiang

Southwest Petroleum University
China

Abstract:

A mathematical model of material resistance against ductile tearing crack propagation is formulated based on a series of experimental investigation and theoretical analysis.

An experimental technique is developed and improved to measure wf, the specific energy of fracture, which represents material resistance against ductile tearing crack propagation. The test technique consists of a side-grooved double cantilever beam (DCB) specimen being loaded via pins at a constant velocity. A series of experiments on mild steel was conducted to improve the design of the DCB specimens and to examine the reliability of the theoretical model.

An energy balance method is used to analyze ductile crack propagating problems. Two basic assumptions are made on the bases of the experimental observations.

A necking zone model is suggested and used to describe the main characteristics of ductile crack propagating. The Necking Zone Model not only suggests a simple engineering approach of calculating the energy dissipated by ductile fracture during quasi-static and impact cases, but also suggests a simple experimental method of measuring dynamic crack propagation resistance using dynamic tensile test and static tensile tearing test.

Finally, a brief introduction is given on scaling laws for ductile structure subjected to intense dynamic loads.

The Math Department will provide refreshments 30 min. prior to the presentation.