Fatigue and Fracture Mechanics
Prof Wang’s Research Group

Prof. Xin Wang
Department of Mechanical and Aerospace Engineering
Carleton University, Ottawa, Ontario, Canada, K1S 5B6

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Professor Xin Wang

- Research expertise
  - Solid mechanics, mechanics of materials
  - Theoretical, computational and experimental fracture mechanics, and fatigue analysis
  - Advanced design methods for structural components in aircraft, nuclear pressure vessel, piping and offshore industries
Research Objectives

- The overall objective is to develop advanced methods for fatigue and fracture assessment of high performance engineering structures such as those in aircrafts, nuclear pressure vessels, pipelines and offshore industries.
- Current research group has experience in the following research areas:
  - 1) Fatigue analysis of aircraft structural components
  - 2) Computational simulations of ductile fracture in pipelines
Fatigue of Aircraft Structural Components

- Fatigue life prediction of aircraft structural components – landing gear components
- Develop reliable tools to calculate fatigue life under complex loading conditions

Fuse Pin in Landing Gear

Load History
Fatigue of Aircraft Structural Components

- Collaboration with Bombardier and UTC LG Inc.
- Detailed finite element analysis
- Advanced material constitutive models, and low cycle fatigue life theories and testing

FE Simulations
Simulation of Ductile Fracture in Pipeline Steels

- Develop computational models to simulate ductile crack propagation in pipelines
- Collaboration with Natural Resources Canada

Pipeline Failure  How to prevent?
Simulation of Ductile Fracture in Pipeline Steels

- Develop ductile fracture models
- Assess and develop fracture criteria in small-scale specimens and apply to large structures
- Develop/design codes and standards for high strength, high toughness pipeline steels
Simulation of Ductile Fracture in Pipeline Steels
Simulation of Ductile Fracture in Pipeline Steels
Current Graduate Student Opportunity

- Study/develop failure assessment tools for embedded flaws in pipelines
  - Using the finite element model approach
- Funded through collaboration with National Resources Canada
- Start Fall 2019 or Winter 2020
Thank you!

Contact:  
Prof. Xin Wang, Ph.D., P. Eng.  
Tel. (613)520-2600X8308  
Xin.Wang@carleton.ca

Or

Mr. Chris Bassindale (current Ph.D. student)  
ChrisBassindale@cmail.carleton.ca

Any inquiries are welcome!