

Research Group Profile

Applied Mechanics Research & Consultancy Group (AMRCG)



NICHE AREA

- Computational Solid Mechanics
- Structural Dynamics
- Structural Impact and Crashworthiness
- Acoustic Emission
- Noise & Vibration
- Thin-walled Structures
- Finite Element Analysis
- Lightweight Materials
- Mechanics of Composites
- Continuum & Damage Mechanics
- Fatigue & Fracture Analyses

SERVICES & FACILITIES

- Tensile-fatigue Testing Machine
- Digital Image Correlation (DIC)
- Open-source Laboratory
- Computational Solid Mechanics Laboratory
- Commercial Software: LS-DYNA, ABAQUS and MSC Marc

MEET OUR TEAM

RESEARCH GROUP LEADER

Dr. Mohd Ayub Bin Sulong

RESEARCH GROUP MEMBER

Assoc. Prof Dr. Zair Asrar Bin Ahmad

RESEARCH GROUP MEMBER

Assoc. Prof Dr. Amran Bin Alias

RESEARCH GROUP MEMBER

Assoc. Prof Ir. Ts. Dr. Zaini Bin Ahmad

RESEARCH GROUP MEMBER

Assoc. Prof Dr. Mohamed Ruslan
Bin Abdullah

RESEARCH GROUP MEMBER

Assoc. Prof Dr. Norhayati Bt Ahmad

RESEARCH GROUP MEMBER

Dr. Desmond Daniel Chin Vui Sheng

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PROJECT HIGHLIGHTS

Pengerang consultation project
Project 1: Structural Dynamic Analysis on Steam Turbine Unit 4710A/C.
Project 2: Structural Dynamic Analysis on Steam Turbine Unit 4300A.

UTM-Hasanuddin University, Indonesia – lightweight structure for energy absorption application

AMIC-UTM Contract Research Project RM800k – collaboration with CTRM & Airbus :
DIC – Damage assessment of laminated composites

UTM-Oglaend Industry – Finite Element Modeling Of Pultruded FRP Composite Structures

Noise and vibration –vibro-acoustics performances of BOSCH impact driver

UTM-Kiswire – Fretting Wear Damage Model for Fatigue Life Prediction of Steel Wire Ropes

Plasma tech in mushroom planting (CDL Tech Plantation Sdn Bhd)

Al-Quran e-Braille



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ACTIVITIES

FLAGSHIP PROJECT SUMMARY

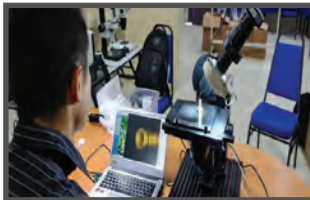
Damage model – DIC & FEA is a research of development of materials constitutive and damage-based models for reliability assessment of the respective advanced structures. Damage-based models are treated for FRP composite laminates and fatigue damage models for laminas. Cyclic cohesive zone model is used for interfaces coupled with Non-Fickian moisture absorption model as moisture may induce degradation of adhesive joints. Damage characterization in CFRP composite laminates is extensively evaluated by DIC technique.

Structural impact and crashworthiness is a research on large deformation of structures under high strain rate loading. The lightweight structures made of various materials are studied using advanced finite element technique in conjunction with experimental tests. Commercial FE code LS-DYNA is employed to simulate the crush behavior and energy absorption capability of the lightweight structures in forms of thin-walled, laminate, cellular form, etc.

Fretting wear model for Kiswire wire ropes – Improvement in breaking strengths of steel cables and wire ropes are made possible through wire rope construction and continuous improvement of the wire materials. New design of cables ropes utilizing these wires requires rigorous testing to establish their reliability. However, complex interaction of loading types, load ratios and local variables including contact pressure, friction and wear behavior render the current phenomenological-based reliability prediction inaccurate. A new mechanism-based fatigue life model is proposed for the long term reliability prediction ropes. The methodology is based on computed local stress and strain fields in critical wires of a stranded wire rope or cables by FE simulation and measured strength-life (S-N) curve of the The former is dependent on the wire rope construction, loading and end conditions while the latter requires consideration of large number of test parameters including stress range, mean stress grade and quality, pre-load and wire gage length. Primary failure mechanisms of abrasion-induced fatigue damage are quantified and incorporated into the procedure. The resulting fatigue methodology for steel wire ropes is validated using measured test data.



Development of tune mass damper for vibration reduction in vertical motor pump system



Development of modular microscope design



Development of electronic Braille assistive device for the blind