

**Professorial
Lecture** **UiTM**

**FATIGUE
LIFE
MONITORING
of FIGHTER
AIRPLANES**

Wahyu Kuntjoro

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PREFACE

Fatigue is paramount in the design of airplanes. Fatigue failure is almost always “spectacular” and catastrophic in nature. A very specific fatigue requirement is laid down in any airworthiness regulation. To consider fatigue in the design of airframes (aircraft structures) is mandatory. Particularly in fighter airplanes, the branch of fatigue analysis that is employed is rather special, due to fighter spectrum loads that tend to be high. This is logical as fighter airplanes are highly manoeuvrable and tend to do high “g” flights. Hence a specific analysis type of fatigue that is called Low Cycle Fatigue (LCF) has grown to meet the high “g” fatigue load requirement.

It has to be mentioned though that transport airplanes are not based on fatigue concept as the one applied for fighters. Fighters are based on the so called Safe Life design, implemented through LCF concept. Transport airplanes are based on the concept of Damage Tolerance, where the analysis is more on the crack behaviour, crack propagation, leaning on the fracture mechanics.

The book starts with introducing fatigue in general, fatigue loads, fatigue mechanism which involves crack initiation and propagation, the concept High Cycle Fatigue (HCF), fatigue life analysis, and also some regulations on fatigue of airplanes. The next section is dedicated for describing cracks, stress intensity factor, and

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