

## REMAINING STRENGTH AND LIFETIME OF THE AL ALLOY AIRCRAFT COMPONENTS

IGOR PAVELKO

*Aviation Institute , Riga Technical University , 1B Lomonosova str,  
Riga, Latvia<sup>\*</sup>  
Igor.Pavelko@rtu.lv<sup>†</sup>  
<http://www.rtu.lv>*

VITALIJS PAVELKO

*Aviation Institute , Riga Technical University , 1B Lomonosova str,  
Riga, Latvia<sup>‡</sup>  
Vitalijs.Pavelko@rtu.lv<sup>§</sup>  
<http://www.rtu.lv>*

SERGEY KUZNETSOV

*Aviation Institute , Riga Technical University , 1B Lomonosova str,  
Riga, Latvia<sup>\*\*</sup>  
s.v.kuznetsov@btv.lv<sup>††</sup>  
<http://www.rtu.lv>*

ERIKS OZOLINSH

*Aviation Institute , Riga Technical University , 1B Lomonosova str,  
Riga, Latvia<sup>‡‡</sup>  
eriks\_ozolins@inbox.lv  
<http://www.rtu.lv>*

ILMARS OZOLINSH

*Aviation Institute , Riga Technical University , 1B Lomonosova str,  
Riga, Latvia<sup>§§</sup>  
ilmars\_o@inbox.lv  
<http://www.rtu.lv>*

**Abstract** This area research is focused to application of general principles and models for prediction of the remaining strength and lifetime of all kinds of structural units of the Al alloy aircraft components. It is very important problem of practical implementation of integrated system of structural health monitoring (SHM). The MI8 helicopter tail beam is an object of possible damages and the remaining strength and lifetime analysis. That is typical Al alloy structural component for which is very large information of full-scale testing and operation experience. The limit load determination, stress and deformation finite element analysis (FEA), and dynamics properties of a tail beam were done at first stage. The critical crack length for each kind of damages and the remaining strength and lifetime prediction was done at second stage, and discussed the probabilistic properties of obtained estimates. The original model of a fatigue crack propagation was developed for crack growth predicting together with the original estimate of variable amplitude effect.

**Keywords** Al structure; strength; lifetime; fatigue; crack.