

## **INTEGRATED TOOL FOR THE ANALYSIS OF AIRCRAFT WING FIXED LEADING EDGE STRUCTURAL COMPONENTS**

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### **KEYWORDS**

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### **ABSTRACT**

The wings of an aircraft model consists of various components, both fixed and movable, such as ribs, spars, skins, stringers and movable components such as the leading and trailing edges as well as spoilers and ailerons respectively. Wing component design is an iterative process involving many iterations. Many commercial CAD/FEA/CFD tools and customized software's are used in the design of the wing components. Both Global Finite Element Model (GFEM) and Detailed Finite Element Model (DFEM) are used in the analysis. Typically GFEM models are termed as load models and are simplified versions without involving many structural details. GFEM models utilizes 1D elements for ribs and 2D elements for panels. During design iterations, GFEM models doesn't undergo major structural changes except changes in material, cross-section or thickness. Design iteration process requires modification of GFEM models several times. Creation and modification of GFEM models manually is laborious and time consuming process, prone to errors. Hence it is essential that we automate the process of creation and updation of GFEM models. This paper presents an automated approach to update existing GFEM models in CAD and FEA environments. The developed approach has been implemented as an integrated tool in CATIA V5 and Patran environment. The integrated tool eliminates tedious repetitive procedures involved in manual extraction of cross-section, thickness, materials, loads, etc from updated CATIA models and updating same in GFEM models. This

integrated tool is a quick, inexpensive and effective technique for performing FE analysis of ribs, slats and panels used in FLE of most aircraft. This work uses Patran-PCL, CATIA-VBA and .Net to develop integrated tool and substantial savings in effort are achieved through the use of developed tool without producing additional errors.