بِسْمِ اللَّهِ الرَّحْمَٰنِ الرَّحِيمِ

إِنَّا فَتَحْنَا لَكَ فَتْحًا مُّبِينًا

لِّيَغْفِرَ لَكَ اللَّهُ مَا تَقَدَّمَ مِن ذَنبِكَ
وَمَا تَأَخَّرَ وَيُتِمَّ نِعْمَتَهُ عَلَيْكَ وَيَهْدِيَكَ صِرَاطًا
مُّسْتَقِيمًا ۝ وَيَنصُرَكَ اللَّهُ نَصْرًا عَزِيزًا ۝

صَدَقَ اللَّهُ الْعَظِيمُ

Dedication

We dedicated our research to our parents.

In addition to all my teachers who help us in our study and finally all students.

Acknowledgement

First and foremost, thank God Almighty, then we would like to express our great appreciation to Dr.AbdElraheemSa'ad for his valuable and constructive suggestions during the planning and development of this research work. His willingness to give his time so generously has been very much appreciated.

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المستخلص

الجناح المرن هو ذلك الجناح الذي يصنع من المواد المركبة أو الذكية التي تغير من شكلها إعتمادا على الوضع المطلوب لتحسين الخصائص ديناميكا الهواء و التحكم بالطائرة.

تحسين خصائص الجناح الإيروديناميكية (زيادة الرفع, تقليل العزوم, تأخير إنفصال الهواء عن سطح الجناح و تقليل إستهلاك الوقود) و ذلك بتغير شكل مقطع الجناح.

هذا المشروع تطوير لبحث تصميم الجناح المرن و ذلك عن طريق إختبار خصائص المواد المركبة أو الذكية عن طريق إختبارات النفق الهوائي. و أيضا تطوريه عن طريق دراسة تأثير الجناح المرن في أداء الطائرة و مقارنة النتائج بالجناح التقليدي.

Abstract

The Flexible Wing is that wing which made by smart materials can be changed its shape depending on the situation in order to optimize aerodynamic efficiencies and aircraft control. Improve the wing aerodynamic characteristics (increase lift, decrease the parasite drag, decrease pitching moment, delay flow separation and decrease fuel consumption) by various the wing camber.

This project is development to the flexible wing design research, and it’s divided into two parts, first part testing the properties of the materials which used in the flexible wing design in the wind tunnel, second part study the effect of flexible wing on the performance of the aircraft and comparing it with the rigid one.

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