Escola Tècnica Superior d'Enginyeries Industrial i Aeronàutica de Terrassa
UNIVERSITAT POLITÈCNICA DE CATALUNYA

Department de Resistencia de Materials

Grau en Enginyeria en Tecnologies Aeroespacials

BUDGET

Study of the model-order reduction of the aerolastic behavior of a wing

Final Degree Thesis of:
Rodeja Ferrer, Pep

Director:
Prof. Joaquin Hernández Ortega

Co-director:
Prof. Juan Carlos Cante

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1 Introduction

This part focusses on the economic side of the project. Every element used in the project appears listed with its current market value. Moreover, the total hours spent have been computed and a price per hour has been assigned.

The budget is divided into different sections depending on the nature of the listed elements. A final section is added to calculate the total cost.

2 Costs

2.1 Working Hours

To calculate the cost of time, an hypotetical annual salary of 36000€ for a novel enginer has supposed. Considering a working week of 40 hours, the total hour-rate would be at 18.75€/h. Using this and the hours listed below, the total amount correspoding to working hours have been computed.

Table 1: Working hours costs

Concept	**Time [h]**	**Cost [€]**
Information research	**80**	**1500.00**
Development of the Project Charter	**10**	**187.50**
CAD software development	**188**	**3525.00**
Generation of a basic wing	90	1687.50
Advanced airfoil settings	10	187.50
Support for structural settings	8	150.00
GID file reverse engineering	25	458.75
Generation of GID files	10	187.50
Kratos files reverse engineering	25	458.75
Generation of Kratos files	10	187.50
Support for default boundary conditions	10	187.50
Data preparation and postprocess	**65**	**1218.75**
Generate the mesh	5	93.75
Code a program to automatize the simulations	5	93.75
Modify Kratos source to extract the matrices	30	562.50
Build a Matlab interface to interpret Kratos results	15	281.25
Assemble the elemental matrices	10	187.50
MOR implementation	**30**	**562.50**
Implement a MOR model for the pressures	10	187.50
Design a better interpolation method	10	187.50
Implement a MOR model for the displacements	10	187.50
Final data analysis and postprocess	**60**	**1125.00**
Calculate the errors of the models	10	187.50
Calculate the aerodynamic forces	5	93.75
Build a Matlab interface export the results	15	281.25
Analyse the results	30	562.50
Documents and others	**50**	**937.00**
TOTAL	**483h**	**9056.25€**

2.2 Software licenses

In the table 2 the total cost related to software licenses has been computed. As seen, not much third party software has been used and most of them are open source or has important discounts for students.

Table 2: Software licenses costs

Concept	**Unit**	**Cost [€]**
Cimne's Kratos	1	open source
Cimne's GID	1	0.00*
MATLAB R2016a	1	35.00**
Latex	1	open source
Github's Atom	1	open source
TOTAL	**5**	**35.00€**

* Offered for free as a UPC student

** Student license cost

2.3 Hardware

All software development, simulations, and reports have been done on the same laptop machine with an external display and a few peripherals for improved work speed.

Table 3: Hardware costs

Concept	**Unit**	**Cost [€]**
Laptop	1	1250.00
Screen	1	400.00
Other	-	60.00
TOTAL	**2**	**1710.00€**

2.4 Total Budget

In the table 4, the total estimated cost of the project has been computed from the different sections of this budget.

Table 4: Total budget

Concept	**Cost [€]**
Working hours	9056.25
Software licenses	35.00
Hardware	1710.00
TOTAL	**10801.25€**