Multi-objective optimization of unconventional airfoil at low Reynolds number

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Abstract. This is a supplementary material of the paper published in the Ibero-Latin American Congress on Computational Methods in Engineering (CILAMCE 2024).

Keywords: Unconventional Airfoils, Multi-Objective Optimization, Low-Reynolds Number (up to 5 keywords)

1 Computing time

In total, 60 iterations were performed for the flat airfoil model with two deflections, divided into 10 iterations for each Reynolds number value. The Reynolds number ranged from 1.5×10^4 to 9×10^4, with an increment of 1.5×10^4 between each value. Due to the considerable execution time of each model iteration, which exceeded 20 hours, multiple machines were required. A total of six computers were employed to handle the computational load, each running 5 iterations simultaneously for most of the time. Table 1 presents the specifications of each machine used in the process. Analyzing the execution time metrics reveals a significant variation in the average execution time between different machines. This disparity can be attributed to the possibility that the processors of the Intel950 and Intel12600 machines were being used remotely for other research projects by different users. This sharing of resources may have directly impacted the performance of these machines for the project.

Table 1. Description of machines used for running GDE3.

Machine	Processor	Model	Speed	Cores	Memory	Avg. Time	Std. Dev.	Total Runs
Intel3770	Intel Core i7	3770	3.40GHz	8	CPU	30h20m	3h19m	10
Intel950/1	Intel Core i7	950	3.07 GHz	8	CPU	58h14m	1h15m	5
Intel950/2	Intel Core i7	950	3.07 GHz	8	CPU	57h01m	1h16m	6
Intel12600	Intel Core i5	12600	3.40GHz	6	SSD	39h46m	4h29m	9
Ryzen4600H	Ryzen 5	4600H	3 GHz	6	SSD	23h03m	3h04m	20
Ryzen2200G	Ryzen 3	2200G	3.5GHz	4	CPU	23h54m	2h53	10