

REVIEWS ON THE MANUSCRIPT [17]

Reviewer 1:

Comments:

The article is written more like a story than a scientific paper, but it works well.

The approach is innovative and interesting, although the author focuses mainly on the analysis of the balloon properties.

The structure should be changed (see the Organization and Presentation section).

There are some crucial drawbacks in the solution (See below).

The strongest and the weakest aspect of the paper:

The strongest aspect of the paper is the detailed theoretical analysis of the balloon properties, nozzle optimization, and wheels optimization.

The weakest aspect of the paper is that the design of the car is not presented on any photograph or scheme.

The solution lacks the discussion on why such a design was decided to be the best. Also, efficiency was not calculated for any of the cases.

Organization and Presentation:

The paper is rather easy to read. The division into an introductory part, a few parts providing the main contents, and the conclusions is visible, but not clear.

The text should be divided and named with section titles. The main parts should be: abstract, a few introductory chapters (introduction, theoretical analysis, assumptions, etc.), the main contents (theoretical results, experimental results etc.), and conclusions at the end.

Style:

The article is interesting and understandable.

However, some of the author's comments should be removed (like "of this brilliant idea", page 2. Even if it is indeed a brilliant idea.)

The reviewer enjoys the style, sense of humor, and the attitude of the author. However the author should use sometimes a bit more formal way of writing.

Additional Questions:

- What was the highest efficiency in your design?
- Why there is a small maximum near $V = 0.0002 \text{ m}^3$ on the Fig. 3.?
- Do your estimations for the elastic properties and for the energy of a balloon depend on its shape?
- What was the longest traveled distance for your car?
- What are the limitations of your approach?

References:

Authors don't refer to any additional literature or external sources, which is a drawback of the article.

Recommendation:

- Check all the captions under pictures. They are sometimes misplaced or missing (Fig. 1, Fig. 4)
- Divide the text into parts (abstract, conclusions, etc.)
- It would be better to consider two symmetrical elastic forces acting on a small piece of the membrane, due to the symmetry of the problem (Fig. 1)
- Please consider revising any parts of the text that are unspecific and do not clarify on what results are obtained and what conclusions are drawn.
- Attach a chapter (five sentences approx.) with a discussion of the limitations of your solution

Summary:

The manuscript is recommended for publication after a few revisions.

Reviewer 2:

This paper has no structure at all.

Much of the text is irrelevant, and the author tries to use a joking style that is quite misplaced in the context.

There is no clear plan of the investigation and no conclusion except for an extremely general and not very illumination one. There is complete lack of references, and the question asked in the problem is not answered.

The theoretical formula beside Figure 2 is not correct, only valid (maybe) for a very small part of the range of balloon volume. There are easily accessible references on the web for a correct formula.

I do not recommend this paper.

Reviewer 3:

The manuscript provides some insight into the physics of a stretched air balloon.

It is evident that the author has performed an amount of possibly promising experimental work but the results of this work are not presented in a sufficiently clear way.

Figure 2 : report in sufficient detail how the pressures were measured. Is the y-axis showing the extra pressure ΔP ? Is the x-axis showing the total volume V or the extra volume ΔV ?

If ΔP is the value considered at the y-axis, is it true that the atmospheric pressure of ca. 100 kPa is increased up to ca. 103 kPa, i.e. by 3%? Is it true that the maximum inflation of the balloon was 35 liters?

Is the theoretical line a fit or a direct calculation? If a calculation, how the input parameters were found?

Figure 3 : report in sufficient detail how the energy is measured.

What manipulations have been performed with the reference plastic bag and with the balloon?

Figure 5 : What is the x-axis? Seconds? Whatsoever consider plotting both data sets on one graph as only the difference between the two datasets is relevant.

Figure 7 : What is the curve? A fit or a direct calculation? If a calculation, how the input parameters were found?

The experimental setup, as presented in the manuscript, delivers some possibly interesting results. Clarify all essential experimental details.

Address each of the investigated topics (influence of the nozzles, influence of the wheel diameter, measurement of the extra energy with a reference plastic bag etc.) in small structurally separated chapters.

The manuscript is now a continuous narrative where the logical sections are not immediately seen. Devise a structural plan and add sub-sections to the text. For example, the phrase, “so now I can write conclusions”, should be removed and the section “Conclusions” added.

The work appears to deserve publication, but only if all essential experimental details are properly explained and become sufficiently comprehensible.

Hereby I ask the editor to forward me the revised manuscript for a second check.

Editorial commentary and request

We agree to the prevailing opinion of all reviewers that an overhaul of the manuscript should be undertaken to fix the narrative, the structure, and more importantly the clarity of the quantitative results.

We acknowledge, however, that the manuscript appears to feature some interesting measurements that are used to characterize the elastic energy stored in the rubber membrane (Figure 3), non-linear behavior of the membrane (Figure 2) and the role of a few parameters on the final range of the car, not its efficiency.

This potential has been outlined by the Reviewers 1 and 3. We believe that the serious and justified concerns of the Reviewer 2 may be resolved, to some extent, upon the thorough overhaul of the manuscript.

Style: We resolve that many stylistic features are inappropriate for the publication. Not only they are nonsensical but they may also be quite disrespectful towards the broad readership of the book.

These include the paragraphs with “very tired me and a lot of broken equipment” (page 1), “king-sized burger” (page 2), “inflated frog” (page 3), “fighting air drag is like fighting a baby” (page 3), “my fingers had some rest” (page 5), “drunk suicidal teen” (page 5), “minute of science” (page 6) and the cases of similar phraseology.

We request that the text is revised to remove nonsense and reduce the amount of sarcasm to a tolerable minimum.

Structure: We recommend implementing rigorously the suggestions of all three reviewers.

Aims: The manuscript starts with a claimed focus on maximizing the efficiency of the car. The term *efficiency* is used four times in the text: to set the goals of the project (page 1), to discuss a method to determine the value without defining it (page 3), and

to suggest that the maximum efficiency would coincide with the first local maximum on the dependence of traveled time vs nozzle diameter in a single specific set of experimental data (page 4.) Consider resolving the inconsistency between the goals and the results.

Data: Take an extra care to clarify the data acquisition routines and the experimental results as requested by the Reviewer 3.

“Super-elastic steady”: This term and the rationale for introducing the notion are obscure. Check the mechanical properties of a rubber membrane and describe the plateau more accurately.

Formula 2: check especially rigorously and resolve the concern of the Reviewer 2 that the formula is invalid for the system.

Concept: It appears clear that the authors consider only the cars where the deflating balloon provides propulsion (*a rocket-type car.*)

Please report this in the introduction and justify shortly *why* this concept is considered and why any other possible approaches are not. This explanation would equally work as a necessary introduction for the readers into your approach.

After thorough consideration and evaluation of the reviews and of the manuscript, we take the editorial decision to request revision.