On Maximising Specific Impulse in Human Flatulence Powered Propulsion

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1 Introduction

Recent trends in alternate propulsion technologies have tended towards low-cost methods for personal transportation. Human Flatulence (HF) as a propulsive power was prognosticated by Hoo, Haa and Houch [4] but no quantitative analysis was carried out, possibly due to low tolerance to strong odours. Ball and Locks [2] simulated immediate usage of HF after production for transit for short distances using an Odour Corrected Flux Algorithm. Schit [6] suggested increasing the methane content of flatulence in order to achieve greater thermodynamic thrust but did not report results for high methane content combustion owing to accidental burns on the HF production apparatus.

In this study, the specific impulse for a HF powered human body is calculated and a gassification and odour effects are reported. Suggestions for optimising the above parameters are also made. The malodorous coefficient needs to be reduced at all times otherwise not only do other humans in the vicinity but sometimes even the testing human may pass out.

2 List of symbols

ρ, density of water, m, mass of human, V, Volume of human, g, gravitational acceleration, I_{sp}, specific impulse, $\dot{m}$, rate of mass flow of flatulence, u_e, exit velocity of gas, p_a, ambient pressure, p_e, exit pressure, A_e, exit area of orifice

3 Experimental Setup

A strong stomached human (here an IIT student) is made to stand on a platform hovering on a cushion of air above the floor to counter friction effects. The HF orifice is sufficiently exercised to control exhaust area and the velocity variations of emissions are controlled using abdominal pressure . Accelerometers are attached to the body to measure specific Impulse, I_{sp} and are calibrated by hurling the human from the top of a water tower in IIT Madras and observing acceleration readings when the human reaches the tub of water kept at the bottom to break his fall. The acceleration is given by:

$$a = \frac{\rho V g d - m g H}{2 m H} \tag{1}$$

where H is the height of the tower and d is the depth till which the human sinks before rising towards the surface again.

The Specific impulse of any propulsive device may be given as:

$$I_{sp} = \frac{\mathcal{F}}{\dot{m}} \tag{2}$$

It is therefore thrust per unit mass flow of the flatulence. It can be expressed as:

$$I_{sp} = u_e + (p_a - p_e)\frac{A_e}{\dot{m}} \tag{3}$$

For any propulsive device the specific impulse has to be maximised. The methane content should be as great as possible to reduce the $\dot{m}$ term. At the same time u_e can only be increased by forcing the gas violently using the abdominal muscles. In order to increase the methane content and enhance the human's gassification ability, ingestion of different foods are required.

This experiment will deal with the commonly used fuels for initiating good flatulence profiles alongwith a control case of sambhar rice made in Alakananda mess. The maximum methane content is generated by beans mixed with lots of chillies obtained from a vendor in Velachery. Another fuel used is Beef-by-the-bucket as served in a 'military hotel' called Runs in Adyar. The human subject was made to gorge on the above foods then placed on the frictionless platform and asked to propel himself forward using his own flatulence. The laboratory was heavily padded with activated charcoal to remove all malodours and sprayed repeatedly with all the perfumes of Arabia to prevent the test subject from fainting. The human was made to wear heat-shields to protect his skin during shock formation at supersonic speeds.

The malodourous coefficient is calculated by using a sample sniffer volunteer group made up of captured terrorists and death-row inmates. All their brains are connected to an EEC machine to monitor brain activity. The death point is defined as the point when atleast half of all the sample brains cease activity due to the flatulence odours. The Malodorous coefficient is defined as:

$$MC = \frac{No.\ of\ volunteers\ alive\ at\ that\ time}{Brain\ Activity\ of\ living\ volunteers} \quad (4)$$

4 Results and Discussion

Figure 1. shows the plot of Specific Impulse with increasing gassification quality of the flatulence. If the human is frightened at some point by showing him his projected end sem marks, based on his performance so far, the stomach churning so produced will increase the gassification of the flatulence leading to greater specific impulses.

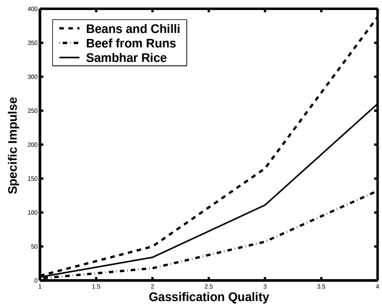

Fig.1 Effect of Gassing Quality

It was observed that the chilli and beans at peak gassification were good enough to cause supersonic speeds. The ensuing shocks destroyed the computers on which the simulations for this study were carried out and hence we are only presenting experimental results.

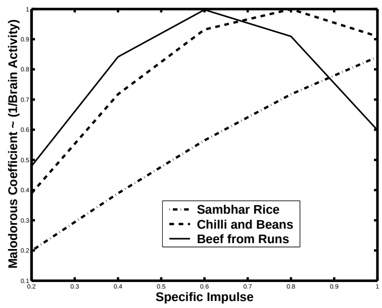

Fig. 2. Increase in Odour at High I_{sp}

Figure 2 shows the increase in the Malodorous coefficient (M.C.) due to increasing specific impulse. This can be explained as at higher I_{sp} the area of the orifice will expand as seen in equation 3, spewing forth more smelly gases. The death point was achieved during the trial and so new sets of volunteers had to be recruited. The curves show a trend such that it may seem that the M.C. is reducing with greater thrust and production of emissions after the death point peak on two of the graphs. But this can be explained based on the fact that the new set consisted of IIT students, who are used to living unbathed and smelly thereby having resistance to odours. Also their brain activity was small to begin with, possibly owing to the fact that they were in their final year and had ceased using their brains for a long time so the EEC sensor couldn't pick up much of a difference.

5 Conclusions

The flatulence powered propulsion is studied for different causative agents and the effects of greater impulse on odour is seen. Increasing the gassification quality of the flatulence by stomach churning increases the impulse so much that even supersonic speeds might be reached. Gas escaping from the orifice at the back propels the human body forward. It is suggested that in the future maybe these expended gases may be burnt by placing a flame just behind the exit. Thrust will be greater owing to the fact that the combustion will provide more kinetic energy and also that the human will also put some effort from his own side to escape the fire on his behind. In the era of personal transportation, flatulence has many advantages. It is predicted that in the future humans will put on their gas masks and fart to work everyday on roller skates. Attaching wings can even make them fly.

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