EXPERIMENTAL STUDY OF EXISTING CENTRIFUGES IN REAL HOSPITALCONDITIONS

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Abstract

The taking of the data is going to be in real conditions with patients and doctors to monitor the necessary functions of the body after establishing some data we will conducted experiments based on the conditions and mechanisms to see how that affects the end results the gathering of the data will be conducted with human participants and life experiment conditions so the third problem that we have to take in to care is the human safety during the experiments. The hospitals provide the necessary environment for the experiments and for the adjustments of the equipment but we have to take into care that the experiments will be on different human subjects and that this conditions will take effects on the parameters in the experiments. The real challenge is going to be taken into care the difference of the mechanisms types which are going to affect the medical centrifuge and the constantly changing conditions in which the experiments are going to take place.

- *Experimental study of existing centrifuges in real hospital conditions.*
- *The author has done experimental study of existing centrifuges in real hospital conditions.*
- *Achieving a thorough experimental study of existing centrifuges in real hospital conditions.*

1. INTRODUCTION

The electronic management system and collecting information Rotostol 1 consists of the following components:

Access point Server / controller Server / controller software for 32 clients gTouchpad is an open touchpad project aimed at comfort, low latency, and portability. All touchpad functionality is implemented in JavaScript and HTML5, which makes it very easy to implement new features or modify existing. The server side consists of a high performance, multithreaded WebSocket server implemented in C ++. The server supports hundreds of parallel connections. Scrolling and zooming is adapted to the currently active program, giving a smooth and comfortable experience in any program. The software supports auto-reconnection, no user action is needed if the server program gets restarted. – Software developed by from Eng. Dokt. Georgi Valkov

2. EXPERIMENTAL SETUP

For a full testament of the vestibular system it is required a complex axis rotation and translation configuration way too expensive and unnecessary for any hospital.

Studies show that it's not necessary to much to provoke the same effect that Complex system for vestibular testing is causing actually it's only necessary to create an angle between 0 - 45 degree. Nasa has developed a unique solution to the necessity of angular movement the economical solution for special vestibular system testing the solution provides incomplete test and it still is being implemented because of economic necessity.

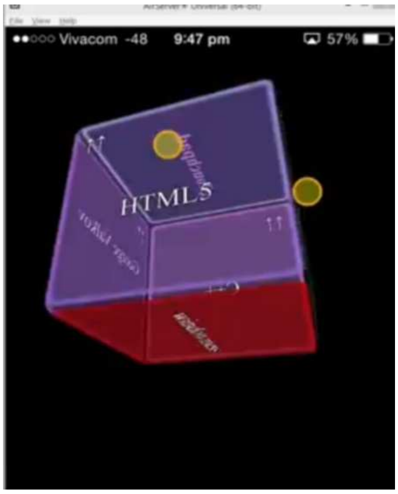


Figure 1: Wifi Client software for Iphone 5S 16 GbArchiver/convertor software

Figure 2: Complex system for vestibular testing

Figure 3: Normal system for vestibular testing usually found in hospital

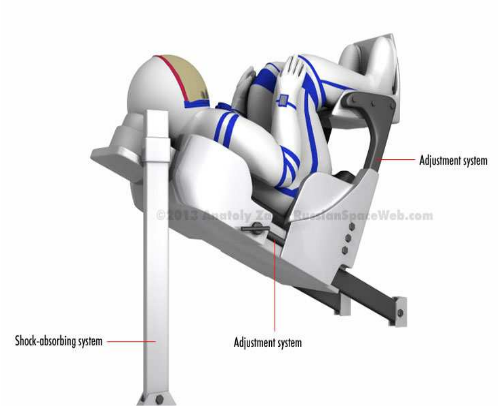
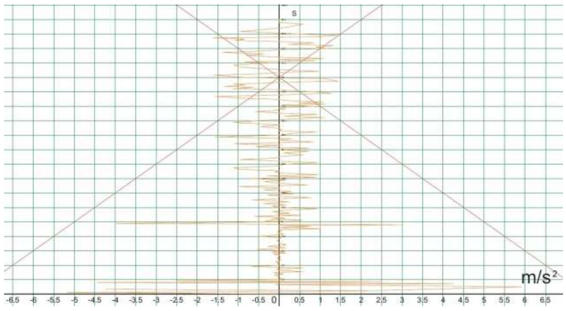
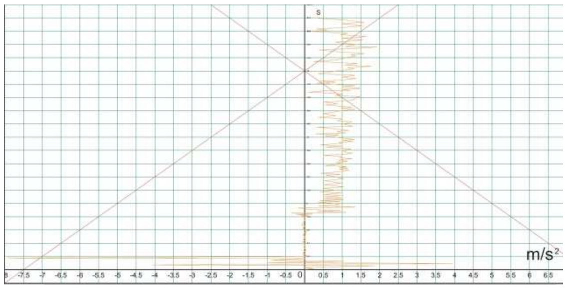


Figure 4: Nasa 45 degree angular platform

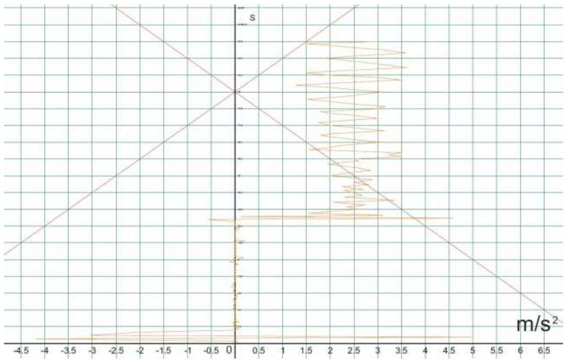
Experimental results for the axis X, Y, Z with medical centrifuge the data was collected in real life conditions with live test subject. The constantly changing acceleration haves a tremendous effect over our sense of balance what we have managed to learn so far is that the conditions and temperature on with it actors and on which we restore our sense of balance played a crucial role to our regeneration and restoring time for our sense of balance. The acceleration conditions established by experiments with live test subject are:



(A) The acceleration change over X for 1 min duration.



(B) The acceleration change over Y for 1 min duration.



(C) The acceleration change over Z for 1 min duration.

Figure 5: Experimental results of medical centrifuge with life test subject Type 1 medical centrifuge.

The basic equations for most centrifugal modelling were introduced. The liquid drag force was given in equation, under streamline flow, and the centrifugal field force was provided in equation. It is a simple matter to equate these to arrive at an analogue equation to the terminal settling velocity, equation, but with one significant difference the distance with time differential is not constant. In a centrifugal field the particle moves radially, see Figure 4 and the radial position is part of the field force – hence the particle accelerates during its travel in the radial direction. Thus, to determine the particle position as a function of time integration is required.

It is well known that from a strict physical definition of forces on a particle, in circular motion, the centripetal force and not the centrifugal force should be considered. An unrestrained particle would leave its orbit tangentially if the centripetal force was suddenly removed. However, this chapter is concerned with separation of particles in rotating flow within a viscous medium, usually water. The particle will not travel tangentially to one orbit, but to lots of orbits, giving the impression of radial movement outwards (provided the particle is denser than the surrounding continuous phase). Mathematically, we can use the well-known expressions, such as equations and, to describe this travel.

$$\frac{dr}{dt} = \frac{x^2(p_s - p)r\omega^2}{18\mu} \quad (1)$$

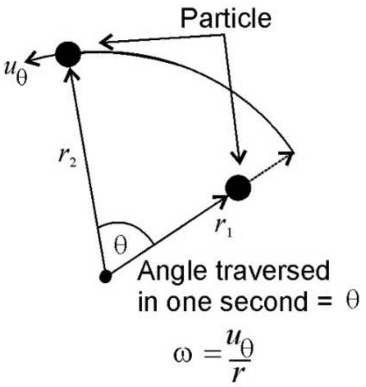


Figure 6: Particle in rotation and definitions.
Type 2 medical centrifuge

As illustrated in Figure 8.1, the centrifugal acceleration is simply the product of the radial position (r) and the square of the angular velocity (ω). The SI units of angular velocity are s^{-1}, but calculated by converting from revs per minute (rpm) into radians per second – then ignoring the dimensionless radian term. In solid body rotation, such as a centrifuge, this is easily calculated from the rotational speed, usually provided in rpm. Thus, 1 rpm is $2\pi\ s^{-1}$as an as an angular velocity. In free body rotation, such as the hydrocyclone, the angular velocity is calculated from the tangential velocity$U_\theta$by$\omega =\ U_\theta\ /\ r$ this is also illustrated on Figure 4. In the hydrocyclone the principle known as the conservation of angular momentumis used; in which knowledge of the tangential velocity at any radial position can be used to calculate the tangential velocity at another because$U_{\theta 1}r_1 = U_{\theta 2}r_2\ = constant$or to take account of frictional losses within the hydrocyclone $U_{\theta 1}{r_1}^{n''} = U_{\theta 2}{r_2}^{\,n''} = constant$where $n''$is an empirical constant, usually between 0.6 and 1.

In filtration within a centrifugal field the body force acts on the liquid, which can pass through the filter medium, or septum, similar to a washing machine or spin drier. The rotation acts in a similar way as increasing the pressure effecting the filtration and it is possible to deduce what this equivalent pressure difference is, using an equation analogous to that given by the static component of Bernoulli's equation (depth x density x acceleration)

$$\Delta P_{CH} = p\omega^2(r_o^2 - r_L^2)/2 \quad (2)$$

where r_o is the radius of the centrifuge and $r_L$is the inner liquid radial position and ΔP_{CH} is sometimes called the centrifugal head. From all of the above, it should be apparent that modification for an enhanced body force due to rotation is simply required. Phone in-hand, we did what any self-respecting technology company would do – destroy it (carefully). Follow us along today as we dive into what's new and exciting this time around, including the A7 64 – bit ARM CPU and the mysterious M7 motion co-processor. At first glance we're seeing a lot of familiar components with the major standouts being the new A7 processor and two new MEMS devices. We are also seeing a new power management IC by Dialog Semiconductor and a new audio codec and class D amplifier by Cirrus Logic. The M7 is a new direction for Apple – in an effort to reduce power consumption, the M7 chip is dedicated to collecting and processing accelerometer, gyroscope and compass data. That being said, the M7 has been a difficult chip to locate on the board and rumors have been going about the lack of a discrete M7 chip inside the iPhone 5s. All expectations up to now were pointing to a stand-out chip as seen below at the Apple Town Hall event.

The accelerometer was tested using the rotational set u shown in figure 6. A small wheel is driven and connected by a lever with length L to a large wheel, on which the accelerometer is mounted. By driving the small wheel with a constant angular velocity the large wheel will show harmonic angular accelerations with constant amplitude and a frequency depending on the angular velocity ω of the small wheel. The latter is driven by a motor. For angles θ with amplitudes smaller than about 30^o, the motion of the wheel can be considered sinusoidally. Consequently, the angular acceleration $\alpha(t)$ of the big wheel becomes [1,2]

$$\alpha(t) \approx -\omega^2 \eta sin \quad (3)$$

where η is a geometrical constant that depends on R, H, G_X, G_y and L.

Figure 7: 7 M7 chip inside the iPhone 5s

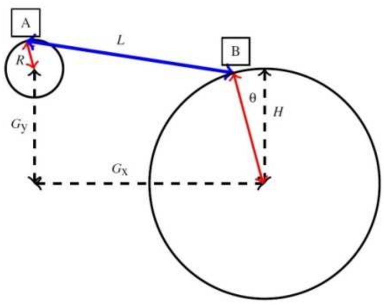


Figure 8: Schematical overview of the rotational setup. [3]
Type 3 medical centrifuge

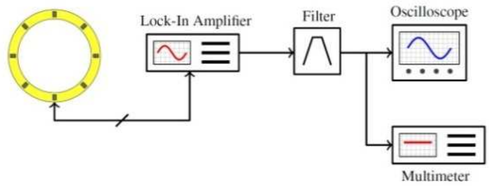


Figure 9: Experimental setup for measurement of the outputbridge voltage. [4,5]

CONCLUSIONS

As a conclusion in critical aspect proves to compensate for the lack of angular acceleration by comparing all 3 types of medical centrifuges we conclude that a hybrid is needed for angular acceleration. An angular accelerometer based on the semicircular channels of the vestibular system is developed. The accelerometer consists of a water-filled tube, wherein the fluid velocity is measured thermally as are presentative for the angular acceleration.

ACKNOWLEDGMENTS

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