UNIVERSITI TEKNOLOGI MARA

TECHNICAL REPORT

THE BUNGEE JUMP : GRAVITATIONAL POTENTIAL ENERGY AT WORK BY USING HOOKE'S LAW

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IN THE NAME OF ALLAH, THE MOST GRACIOUS, THE MOST MERCIFUL

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ABSTRACT

Nowadays, many people like to do extreme activities such as bungee jumping to challenge theirselve to fight with their fear feeling. Some people hold their desire to do it because of their fear of the materials used was not strong enough to support their weight. Any misunderstanding and miscalculation may cause a sudden crash. In 2012, there was an accident occurred involving bungee jumping activity at Victoria Falls, Zambia. In order to identify the level of safeness in bungee jumping activities, this project was conducted to simulate the process when a jumper dives off from a height in such as the maximum diving distance and the maximum lengthening of the bungee cord. An experiment was conducted where the mass represents jumper's weight, elastic cords with different diameter acts as a bungee cord and one meter of iron stand acts like base of jumper standing. This project may give the industry with crucial understanding of this extreme sport. The important of physical quantities likes the maximum elongation of the cord that can be identifying to determine some of safety related issues. In this research, we used Hooke's Law method. Based on the experiment, we got the result that which the suitable weight is good for the certain bungee cord. Therefore, physics could guide to give the answers to a safety questions like "How do I know that the rubber band has the right length and strength for my jump?" and "How am I sure that the g-forces are kept low enough so that the bungee jumping does not hurt?".

1. INTRODUCTION

1.1 Introduction

Bungee jump is well known as an extreme sport. People tied their ankle with an elastic rope and jump from high place such as a bridge or tower. It started in a small village in South Pentecost Island in Vanuatu as a ceremony. In order to demonstrate their courage, the young men jump from a 30 meter high tree. They tied jungle vines around their ankles to stop from hitting the ground.

Modern bungee jumping began at Golden Gate Bridge in San Francisco when four British men jumping from this high place. Later in 1987, A.J. Hacket became world famous when he successfully jumped from the Eiffel Tower in Paris. Then, he decided set up The Kawarau Gorge Suspension Bridge in Gibbston, New Zealand, with 47 meters height as a cpopular bungee jumping area. People who love challenging activities will be willing to spend money for the sake of their interests for the fun of jumping. In a short time, this idea has spread around the world.

Regarding to physicist, bungee jump activities is a process of a conversion of energies through thrilling demonstration. As an object reaches the bottom, gravitational potential energy is converting to elastic potential energy. For many years, basic equations had been used to define events in which mass are suddenly applied to spring.

Bungee rope, which has the same characteristic to a spring, is designed to stretch. The jumper will definitely bounces back up as the rope stretched. In bungee jumping, people wear safety equipment such as helmets and harnesses. This is to ensure that the jumper is free from any injuries if any unexpected incidents occur.

However, besides this electrifying activity, bungee jumping also has certain dangers. The rope need to be on the right size for jumper's weight, or it may be break. The safety harnesses have to fit properly to the body or the force may cause a person's bone to break. The length of cord need to be accurate or a person could hit the ground before it being stopped by the bungee cord.

The equipments use and the force involved may indicate the level of safeties of this activity. In 1989, the activity was banned in France after unexpected accident that causes three deaths.

Meanwhile, after an accident in 1990 and in summer 1992, this activity has been suspended by Australian government. There are also accidents occurred in the United States that have inclining the media to give a great exposure and involve with state governments. But it should be emphasized that this activity is basically involving high level safety. All accidents can detected by human mistake relating to incorrect attachment, mismatch between jumpers and rope, miscalculation of the physics involved, and other mistakes.