UNIVERSITI TEKNOLOGI MARA

TECHNICAL REPORT

# SHADE BALLS AS METHOD OF EVAPORATION SUPPRESSION IN DAM

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Report submitted in partial fulfillment of the requirement
for the degree of
Bachelor of Science (Hons.) Mathematics
Center of Mathematics Studies
Faculty of Computer and Mathematical Sciences

JULY 2016

## ACKNOWLEDGEMENTS

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

Firstly, we are grateful to Allah S.W.T for giving us the strength and good health to complete this project successfully.

We would like to express our gratitude to those helping hands that are responsible directly or indirectly in making sure that we complete our project. It would not have been possible for us to complete this project without their assistance. Of course the deepest appreciation we would dedicate to our visionary supervisor, Madam Wan Roslini Wan Yusoff for her precious time and non-stop kindness in guiding and supervising us as well as for her generosity in sharing a lot of useful information with us. Next, we would thank Malaysian Meteorological Department for their permission to use the data. With this data supply, we are able to proceed our project smoothly. Special thanks to our friend from Department of Physics at University of Auckland, New Zealand for indirect collaboration with us in discussing some Physics and Mathemathics elements in our project. Without their helps, this project may not be able to produce significant and good quality of outcomes.

Not to forget our appreciation to the lecturers for their good advices and new information related to the our project. Besides that, we are so indebted towards the family members and friends for their moral support until the end of this battle. Their persistence, encouragement and support ensured that we would not give up easily.

Lastly, a lot of gratitudes to ourselves as a team for not having a thought to stop our journey in finishing this project even when we were facing bad times. This appreciation to ourselves is a must as we have struggled our very hard in making sure our project is being completed on time. Also a lot of thanks for the coorperation between the members and our endless effort to finish this project. We are grateful that we are able to complete our project on time. Indeed, this journey will be our most memorable experience despite the ups and downs in between.

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## ABSTRACT

The project is to discover how shade balls can help Malaysia in reducing the effect of evaporation that leads to water rationing. The method is decided to be proposed in Malaysia after seeing nowadays phenomenon of El Nino that caused drastic water loss from dams. Some of the evaporation factors are being considered to carry out this project and the methodology is applied based on these factors. The different diameters of shade balls to cover the dam are picked to demonstrate the coverage area of water surface towards evaporation effect. The number of shade balls to be used is determined by the manipulation of shade balls' diameter which will result in how much area of water is getting exposed. In order to accomplish the objectives of this project, Clausius Clapeyron and Dalton's evaporation equation are used. The results obtain has proven that shade balls are significant evaporation suppression method as they help to save huge volume of water from evaporating. In future, this method is hope to be applied in Malaysia.

# 1 INTRODUCTION

## 1.1 Introduction

Global weather changes make the dry season prolonged and evaporation rate of water on earth becomes higher. As supported by the Intergovernmental Panel on Climate Change,IPPC (2007), over the last one decade (1906-2005) our global temperature has increased by 0.74°C. This is the proof of the reality that all parts of the world are becoming hot by time. Regarding the above statement, it was estimated that half of the water stored in the dam may lose due to evaporation (Craig et al., 2005). Evaporation is the continuous process which changes the physical property of the liquid to water vapor regardless the temperature of surrounding. However, the higher temperature of surrounding will cause the evaporation to occur more rapidly than that of the lower one. According to Magin & Randall (1960) the temperature of water and air above it can cause the speed up of evaporation from the surface of the water because due to the kinetic theory of evaporation; more kinetic energy provided to water molecules and enables them to break the cohesive force before moving freely to the atmosphere. Other factors of evaporation which are wind speed, humidity and salinity of water are not to be considered.

## 1.2 Problem Statement

The impact of evaporation to Malaysia, especially in the state of Selangor, is totally significant that almost each year, water rationing is exercised to cope with water level drop in dam due to the dry and hot season. This dry and hot season is also known as El Nino. During the horrific El Nino season in 2013-2014, dry climate and low amount of rainfall has caused the drop of water level in Selangor's dam. According to Jabatan Bekalan Air (2015), Sg. Selangor and Sg.Tinggi respectively has shown the lowest percentage of their deposits at 36.39% and 60.97% . At the same time, other dams got their deposit reading; Sg.Langat Dam 48.25% , Klang Gates Dam 50.04% , Sg. Semenyih Dam 70.80% , Sg. Batu Dam 77.06% and Tasik Subang Dam 86.77%. In comparison to the same period in previous years, all these dams stored savings of