

UNIVERSITI TEKNOLOGI MARA

**EFFECTS OF THE MORETON WAVES ON THE
STRUCTURE OF CORONAL MASS EJECTIONS
EVENTS (CMES) BASED ON SOLAR RADIO
BURST
TYPE II CHARACTERISTICS**

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Thesis submitted in fulfilment
of the requirements for the degree of
Master of Science
(Physics)

Faculty of Applied Sciences

July 2019

ABSTRACT

The Moreton wave (also known as flare wave) has been extensively studied in the hope of explaining the relation between solar flare, Coronal Mass Ejections (CMEs) and Solar Radio Burst Type II (SRBT II) phenomena. It is interpreted as an intersection of coronal Magneto-hydrodynamic (MHD) fast mode shock wave and solar chromosphere. It is well known that the occurrence of CME is always associated with both solar flare and SRBT II. Furthermore, SRBT II is also originated from the MHD fast mode shock wave theory. Previous research showed that Moreton wave constantly associated with solar flare event. As research continued, it was observed during Moreton wave occurrence, the presence of CME also detected. Since there are possibilities those Moreton waves affect the physical structure of CME explosion, it shows a distinct relation between both phenomena which need more detailed analysis. Hence, this study has been done to determine the presence of Moreton wave which gives impact towards the CME structure based on SRBT II characteristics. The drift rate and structures of 28 SRBT II events selected from year 2014 to 2017 and observed by using ground-based Compound Low cost Low frequency Transportable Observatory (CALLISTO) spectrometer were determined. In addition, the CME data of width angle and velocity were obtained from Large Angle Spectroscopy Coronagraph Observatory (LASCO) instrument, while solar flare class and its Active Region (AR) were attained from the Geostationary Operational Environmental Satellite (GOES). Besides, the Moreton wave presence images were achieved from Global Oscillation Network Group (GONG) websites. From the analysis, it was found that there is relationship between Moreton wave and CME structure based on SRBT II detected. As shown by LASCO and GOES data, impulsive CME events has X, M and C class of solar flare in the presence of Moreton wave while gradual CME were associated with C or B class of solar flare. 70 percent of the CME observed were impulsive CME with angle of width more than 60° and have velocity more than 500 km/s associated with both HB and harmonic structure of SRBT II. However, the remaining CME were 30 percent of gradual CME which associated with HB structure of SRBT II does not accompanied by Moreton wave presence. This indicates that Moreton wave presence causes enormous structure of CME bubble with angle more than 60° width and velocity of above 500 km/s and often accompanied by harmonic structure of SRBT II formed. As a conclusion, the Moreton wave presence influence the structure of CME based on SRBT II characteristics has been elucidated.

ACKNOWLEDGEMENT

Firstly, I wish to thank God for giving me the opportunity to embark on my MSc and for completing this long and challenging journey successfully. My gratitude and thanks go to my supervisor Dr. Zety Sharizat Binti Hamidi, my co-supervisors, Dr. Nur Nafhatun Binti Md. Shariff and Tuan Haji Mohd Isa Bin Mohd Yusof.

My appreciation goes to the staffs of the UiTM who provided the facilities and assistance during project. Special thanks to my colleagues and friends for helping me with this project.

Finally, this thesis is dedicated to my dearly father and mother for the vision and determination to educate me. This piece of victory is dedicated to both of you. Alhamdulillah.

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