Study of CME Kinematics and Dynamics

Chia-Hsien Lin1 and Peter T. Gallagher2 and Claire L. Raftery2 1National Center for Theoretical Sciences, Physics Division, Taiwan 2Astrophysics Research Group, School of Physics, Trinity College Dublin, Ireland

The objective of this investigation is to first examine the kinematics and dynamics of coronal mass ejections (CMEs) utilizing multi-wavelength, multi-instrument observations, and then to make a comparison with theoretical models in the hope to identify the driving mechanisms of the CMEs. To reliably identify the driving mechanisms and derive physical properties of the CMEs, we have implemented both qualitative and quantitative comparisons between the data and theories. The three CME models investigated in this study are catastrophe, breakout, and toroidal instability models.

In our previous study on two CME events which occurred on 2006 December 17 (CME06) and 2007 December 31 (CME07), we have identified the theory that suits each CME best and derived their physical properties.

In this current work, we aim to carry out a statistical study by applying our examination strategy to a wide selection of various CMEs. To improve the accuracy of the observed kinematics of the CMEs, we utilize the stereoscopic data from STEREO to reduce the error due to the projection effects. We also incorporate the information from the available EUV, X-ray and radio observational data of the CMEs for our analysis. The results of this study would provide a statistically significant constraint on the CME theories.

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