NUMERICAL EXPERIMENTS OF VARIOUS TYPES OF DISTURBANCE TO THE LOW AND MIDDLE CORONA CAUSED BY THE SOLAR ERUPTION

Xiaoyan Xie\textsuperscript{1,2,3}, Zhixing Mei\textsuperscript{1,2}, Jun Lin\textsuperscript{1,2}

\textsuperscript{1}Yunnan Observatories, Chinese Academy of Sciences, Kunming 650011, China
\textsuperscript{2}Center for Astronomical Mega-Science, Chinese Academy of Sciences, 20A Datun Road, Beijing 100012, China
\textsuperscript{3}University of Chinese Academy of Sciences, No.19(A) Yuquan Road, Beijing 100049, China

Based on the solar catastrophe model, we explore the disturbance caused by the solar eruption, especially some types of large-scale disturbance via numerical experiments. In addition to the phenomena that have been showed by previous numerical experiments, a new structure known as the plasma 'pile-up' was also seen. As the disrupting magnetic structure moves outwards, a fast-mode shock was invoked in front of it. The fast-mode shock expands sideward when propagating forward, and evolves to a crescent shape; eventually the two ends of the crescent touch the bottom boundary and cause various types of disturbance to the near region. As expected, the echo is a common feature that can be identified easily among these types of disturbance. Associating with it is a plasma 'pile-up' region, which is produced by the plasma accumulation behind the echo. This is a brand new phenomenon that has not been reported previously. Two features of the 'pile-up' region drew our attention: its height from the bottom boundary is similar to that of some EUV waves, and its velocity is about 1/3 the velocity of the fast-mode shock touch down site on the bottom boundary, which is believed to be the location of the Moreton wave front. This suggests that the 'pile-up' may be a source of the EUV wave as well. According to our numerical results, we also obtain 'observed' SDO/AIA images in different wave bands. The results show that the characteristics of the EUV waves 'observed' in different bands are indeed different, which is consistent with the true observational results regarding the EUV waves.