THE INITIAL MORPHOLOGIES OF THE WAVEFRONTS OF EXTREME ULTRAVIOLET WAVES

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The morphologies of the wavefronts of extreme ultraviolet (EUV) waves can shed light on their physical nature and driving mechanism that are still strongly debated. In reality, the wavefronts always deform after interacting with ambient coronal structures during their propagation. Here, we focus on the initial wavefront morphologies of four selected EUV waves that are closely associated with jets or flux rope eruptions, using the high spatio-temporal resolution observations and different perspectives from the Solar Dynamics Observatory and the Solar-Terrestrial Relations Observatory. For the jet-driven waves, the jets originated from one end of the overlying closed loops, and the arc-shaped wavefront formed around the other far end of the expanding loops. The extrapolated field lines of the Potential Field Source Surface model show the close relationships between the jets, the wavefronts, and the overlying closed loops. For the flux-rope-driven waves, the flux ropes (sigmoids) lifted off beneath the overlying loops, and the circular wavefronts had an intimate spatio-temporal relation with the expanding loops. All the results suggest that the configuration of the overlying loops and their locations relative to the erupting cores are very important for the formation and morphology of the wavefronts, and both two jet-driven waves and two flux-rope-driven waves are likely triggered by the sudden expansion of the overlying closed loops. We also propose that the wavefront of EUV wave is possibly integrated by a chain of wave components triggered by a series of separated expanding loops.