EUV waves are large-scale propagating disturbances in the solar corona initiated by coronal mass ejections. We investigate the multiple EUV wave reflections at a coronal hole boundary, as observed by SDO/AIA 195 Å on 1 April 2017. The EUV wave originates from Active Region (AR) 12645 close to the disk center and propagates toward the south polar coronal hole with an average velocity of 346 km/s. The interaction of the EUV wave with the coronal hole, which represents a region of high Alfvén speed, is observed as a splitting into two wave components: one continues propagation inside the coronal hole with an increased velocity of 1300 km/s (transmitted wave), while the other one moves back toward the AR, also with an increased velocity of 609 km/s (reflected wave). The reflected EUV wave is subsequently reflected again from the AR and propagates toward the coronal hole, where it is reflected for the second time at the coronal hole boundary and propagates again toward the AR with a velocity of 406 km/s. These events are observed over an interval of 40 minutes. The high cadence SDO imagery allows us to study in detail the kinematics of the direct and multiple times reflected EUV wave. In addition, its multi-wavelength EUV imagery allows us to derive the plasma properties of the corona and the EUV wave pulse via Differential Emission Measure analysis.

We observe quasi circular propagation of EUV wave in the sector of interests. At 23:13:52 UT the wave reaches the border of south coronal hole.

The EUV wave reflected from the coronal hole propagates mainly to North and Northeast. However its propagation is stopped by the dimming associated with the direct EUV wave. Wave crest doesn’t move for some time, while its intensity is increased. Later it goes over dimming back to the source region and coronal hole.

The reflected EUV wave is subsequently reflected again from the active region and propagates toward the coronal hole, where it is reflected for the second time at the coronal hole boundary and propagates again toward the AR with a velocity of 355 km/s.

EUV wave crest is reflected with the speed of 609 km/s from the coronal hole. However after it doesn’t move for some time being stopped by the coronal hole dimming which reflects the wave and propagates in two directions: toward coronal hole and source region. Further it moves over the dimming toward the source region with the mean speed of 200 km/s.

The EUV wave propagates directly toward the South coronal hole with average speed of 340 – 350 km/s.

The border of South coronal hole is located on a short distance of ~300 – 400 ML from the source region.

Further to the coronal hole boundary, fragments of EUV wave move much faster.

The propagation of reflected EUV wave is constrained by the dimming associated with the direct EUV wave. However, with increase of intensity it is extended.

In two directions, toward source region and back toward the coronal hole.

With the propagation of EUV wave the dimming ahead or dark front is intensified (also found in Plant习chitsch et al. 2019).

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