

## M32a A Fast-filament Eruption Observed in the $H\alpha$ Line: Imaging Spectroscopy Diagnostic and Modeling

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On 2017 April 23, a fast filament eruption was observed by the Solar Dynamics Doppler Imager (SDDI) onboard the SMART telescope at Hida Observatory. The eruption was captured in a wide spectral window around the  $H\alpha$  line spanning from  $-9$  to  $+9$  Å, which enabled us to perform an imaging spectroscopy diagnostic. The spectral analysis reveals characteristics of highly blue-shifted plasma up to  $9$  Å, indicating that the filament was ejected towards the Earth with a velocity of  $\sim 400$  km s $^{-1}$ . The apparent velocity and acceleration are about  $800$  km s $^{-1}$  and  $3.5$  km s $^{-2}$ , respectively, both exhibiting a slow rise and exponential-to-linear evolution. We investigate the dynamics of the filament eruption taking advantage of the unprecedented SDDI data. Based on the toroidal-current model, we also apply a numerical approach to get insight into the action of the governing forces during the eruption, such as the hoop force, tension force, and the effect of the gravitational force. Our preliminary result shows that the observed fast acceleration cannot be fully explained by the existing standard models, suggesting that more elaborated modeling are necessary to interpret with higher accuracy the observational results. This is an important aspect for understanding the physical properties of solar eruptions, especially of those that may generate Earth affecting coronal mass ejections.