

## Executive Summary

This month, I had two launches of the MkI Viper rocket glider. In the first launch, the Viper cleared the rail guide at  $\sim 3.0$  m/sec. The Viper pitched down and crashed into the ground. I rebuilt the frame and fuselage. The fuselage was further streamlined. The next launch of the Viper cleared the rail guide at greater than 4.0 m/sec. I had aerodynamic control, no pitch and no roll until  $\sim 30$  ft. The propellants expended before landing and I was able to actuate the canopy release.

## Technical Stuff

This month, I had two launches of the MkI Viper rocket glider. The two launches used PLA fuel cores that were infused with  $\text{KMnO}_4$  at the concentration of 40 gm/L. This was the first infusion at this concentration. The PLA/ $\text{KMnO}_4$  fuel core had been stored in a dry bag since 06/02/25. On the first launch, I used 50 ml of unstabilized HTP at  $\sim 83\%$  concentration and 2 ml of ethanol (O/F = 25) for the oxidizer. Ignition occurred in less than one second. Liftoff mass was  $\sim 1,330$  gm. In this launch, the Viper cleared the rail guide at  $\sim 3.0$  m/sec. The Viper pitched down and crashed into the ground. The impact destroyed almost the whole Viper. I rebuilt the frame and fuselage. The fuselage was further streamlined.

In the next launch, I used 50 ml of unstabilized HTP at  $\sim 80\%$  concentration and 2 ml of ethanol (O/F = 25) for the oxidizer. Ignition occurred in about two seconds. Liftoff mass was  $\sim 1,396$  gm. The increase in liftoff mass is primarily due to a longer more streamlined PLA nose cone. I plan to use this PLA nose cone as a mold for a fiberglass nose cone.

The Viper cleared the rail guide at greater than 4.0 m/sec ([video](#)). Recall, calculations showed that a minimum velocity of  $\sim 4.0$  m/sec was needed for aerodynamic control. During the launch, I had active control of the Viper and managed to maintain control until  $\sim 30$  ft. The Viper pitched down and began to roll. The Viper exhausted all of the oxidizer in this launch  $\sim 3.0$  sec before crashing into the ground. I managed to trigger the canopy just before impact.



Fortunately, the damage was minor and easily repaired. I would call this a crash I could walk (maybe limp) away from. The forward strut broke in three places and the equipment bay broke in one place. A little epoxy glue should be sufficient. As such, the next launch of the Mk I Viper should be in about a week.

Next month, I plan to continue launch operations with the MkI Viper. I plan to make a fiberglass nose cone and further streamline the Viper. Also, I need to practice control and work on releasing the canopy as soon as the oxidizer is exhausted.