

Abstract Submitted  
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**A high precision analysis of a simple helicopter with Tracker** ELIZABETH LEESER, AMY KOLAN, St. Olaf College — Simple systems often play a major role in physics, where the properties of such a system can be extended to complex ones. We have investigated the properties of a simple “helicopter” system. Despite its simplicity, this system is not well understood, either experimentally or theoretically. Our helicopter is similar to paper helicopters which often appear in children’s science projects and undergraduate engineering or physics exercises (George Box helicopters). Our work compliments pre-existing engineering exercises using model helicopters, and provides clearer, more physical explanations for helicopter systems than those currently available in popular literature. Inspired and constrained by the pandemic, our exploration has been carried out in ways accessible to non-scientists. We have conducted experiments in public buildings or our homes, and used only commonly available equipment—a stairwell, video from smartphones, free tracking software, and homemade helicopters made of balsa wood. Currently we are investigating ways in which this rudimentary equipment can produce very precise data. Video analysis often has issues with perspective effects and lens distortion that must be resolved for use in rigorous science. We hope to create methods which make these easily accessible tools viable options for researchers at every level, not only student projects, but also more advanced research.

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