A Survey of the Dynamics and Control of Aircraft During Aerial Refueling

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Abstract: Recent heightened interest in autonomous refueling of unmanned aerial vehicles has stimulated research activity in the area of aerial refueling in general. Aircraft aerial refueling research can be divided into four general areas: influence of tanker aircraft wake turbulence on the receiver aircraft, the dynamics of the drogue and hose, automatic flight control system design for aerial refueling, experiments and flight tests related to the practical implementation of autonomous aerial refueling system. This survey summarizes research activities as well as the current state of knowledge in these areas.

Keywords: Aerial refueling; variable mass system; aircraft dynamics.

Mathematics Subject Classification (2000): 93C20, 93C35, 93C85.

1 Introduction

Aerial refueling is the practice of transferring fuel from one aircraft to another during flight. It allows the receiving aircraft to remain airborne longer, and to take off with a greater payload. Aerial refueling operation with manned aircraft has been implemented by many countries since after the Second World War. In-flight refueling was first proposed in 1917 by Alexander P. de Seversky, who was then a pilot in the Russian Navy. The motive was to increase the range of combat aircraft. De Seversky soon emigrated to the United States and became an engineer in the War Department. He initiated work on Aerial Refueling in the United States. Although experiments in aerial refueling started as

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