

# An Investigation of Spring-Constrained Flapping Blades and Stabilizer Bars for Radio-Controlled Helicopter

by

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(Received on March 31, 2005 & accepted on June 23, 2005)

## Abstract

The effects of rubber, which is installed near the root of the blades of a radio-controlled helicopter in order to constrain blade flapping, and a stabilizer bar on the handling qualities are investigated theoretically and experimentally. The correctness of the equations of motion used in this paper is proved experimentally. Using these equations, the step lateral control responses are calculated and handling qualities are elucidated. On the basis of a flight test, the effect of these handling qualities on the control of the helicopter is examined. The following results are obtained. When the stabilizer bar lock number is small, the control effectiveness becomes small and it is difficult to perform rapid handling. When the strength of the rubber used is small, the time constant for the control input response becomes large, and its ability to stop the undesirable motion becomes worse. When a blade is installed in the hub rigidly without a hinge, limit cycle oscillations of pitching and rolling motions occur. Thus, it is difficult to perform the mission flight.

*Keywords: RC helicopter, handling qualities, rubber, stabilizer bar, rigid rotor*

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