

National Transportation Safety Board

Office of Research and Engineering

Washington, D.C. 20594

Performance Study Addendum

Specialist Report

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A. ACCIDENT

Location: Houston, Texas
Date: May 2, 2020
Time: 02:03 central daylight time (CDT)
Airplane: 369E MD Helicopter, N8375F
NTSB Number: CEN20LA167

B. SUMMARY

On May 2, 2020, about 02:03 central daylight time, a model 369E MD Helicopter, N8375F, was destroyed when it was involved in an accident near Houston, Texas. The pilot sustained serious injuries and the other flight crewmember sustained fatal injuries. The helicopter was operated as a Title 14 *Code of Federal Regulations* Part 91 public aircraft flight.

C. PERFORMANCE STUDY ADDENDUM

In the Performance Study, the possibility of loss of tail rotor effectiveness (LTE) was focused on the time before 02:03:20 after which the helicopter increased speed from 10 kts to 30 kts of groundspeed, consistent with the pilot's report that he accelerated to try to gain control of the helicopter yaw. From 02:02:50 until 02:03:20 the helicopter was on a track of 137°. The helicopter's heading is unknown, but if it assumed to be approximately equal to the track, it would have encountered the reported winds (4 kts from 170°) as a right quartering headwind of low magnitude. The recorded winds were not conducive to main rotor disc vortex interference LTE, weathercock stability LTE, or tail rotor vortex ring state LTE while on this track (assuming the heading was aligned with the track).

A fourth type of LTE, discussed in Advisory Circular 90-95 [1], is titled loss of translational lift. When at speeds below translational lift (lift due to the helicopter's forward motion) more power is required for the helicopter to stay aloft which also results in an increase in the amount of anti-torque needed to maintain yaw control. Additionally, in slow forward flight, the air entering the tail rotor is quite disturbed by the main rotor and is less efficient. The transition to forward flight with translational lift typically occurs between 16 and 24 kts. During this transition the anti-torque requirements are changing and the pilots must be aware and making adjustments as needed.

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Figure 1 (Figure 5 in the Performance Study) shows the helicopter's groundspeed at the end of flight. As stated above, from 02:02:50 until 02:03:20 the helicopter was on a track of 137° into a 4 kts right quartering headwind. The helicopter's 10 to 15 kts groundspeed plus the headwind would have made it susceptible changing lift and power conditions along with changes in the required anti-torque. If sufficient anti-torque was not added, it could result in an uncommanded right yaw.

Additionally, as the helicopter accelerates, and translational lift increases, it induces a right rolling motion and the helicopter pitches up [2] necessitating increased anti-torque and forward cyclic. The result is that if the helicopter experiences an uncommanded right yaw below the transition to translational lift, increasing power to increase speed can further contribute to the right yawing motion and need for anti-torque.

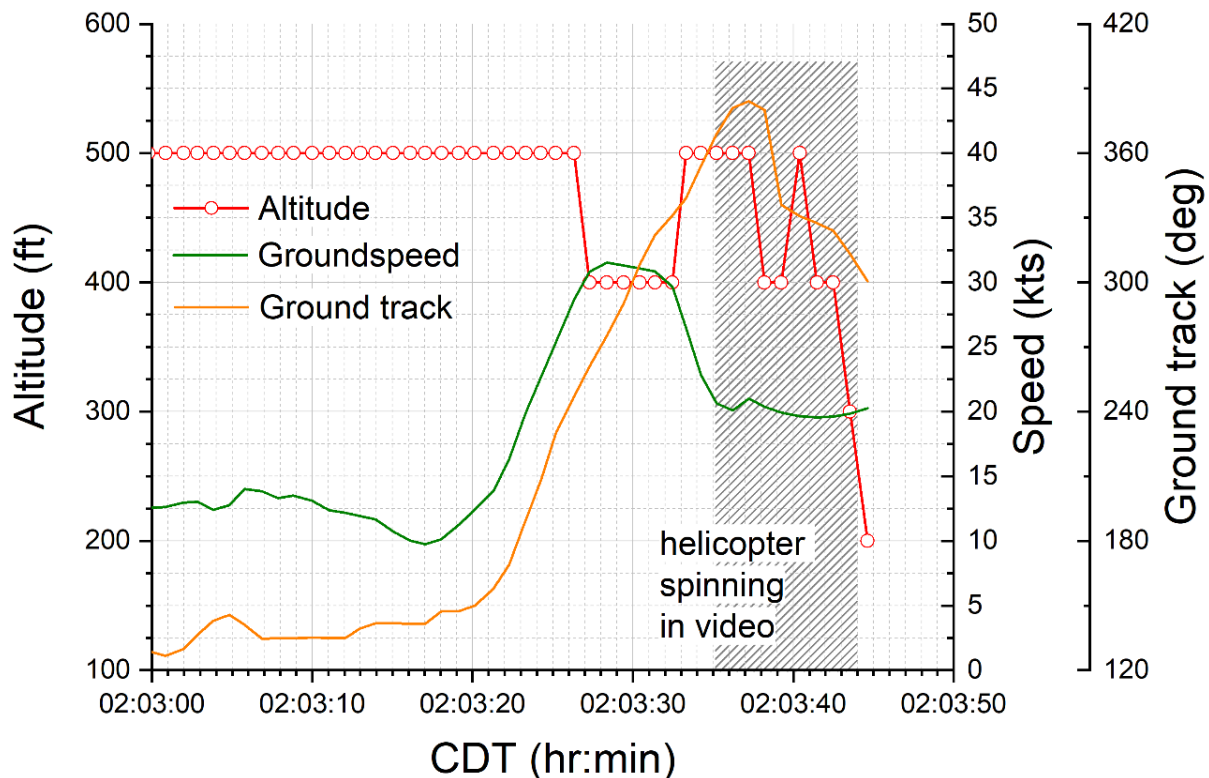


Figure 1. Altitude (msl), groundspeed, and ground track for end of flight.

D. CONCLUSIONS

The increased anti-torque requirement when below the onset of translational lift and right rolling moment induced by the introduction of translational lift when accelerating from low speed may have been factors contributing to the uncommanded right yaw event reported by the pilot. Without additional data about when the yaw event began, the helicopter's attitude and power, or pilot inputs, it is not possible to evaluate the cause of the accident.

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E. REFERENCES

1. Unanticipated Right Yaw in Helicopters, Advisory Circular 90-95, Federal Aviation Administration, 1995.
2. Section 2-20, Effective Translational Lift, Helicopter Flying Handbook, FAA-H-8083-21A.