airflow in order to provide a steady and constant antitorque reaction. The pitch and AOA of the individual blades will determine the thrust. A change to either of these alters the amount of thrust generated. A pilot's yaw pedal input causes a thrust reaction from the tail rotor. Altering the amount of thrust delivered for the same yaw input creates an imbalance. Taking this imbalance to the extreme will result in the loss of effective control in the yawing plane, and LTE will occur.

This alteration of tail rotor thrust can be affected by numerous external factors. The main factors contributing to LTE are:

1. Airflow and downdraft generated by the main rotor blades interfering with the airflow entering the tail rotor assembly.
2. Main blade vortices developed at the main blade tips entering the tail rotor disk.
3. Turbulence and other natural phenomena affecting the airflow surrounding the tail rotor.
4. A high-power setting, hence large main rotor pitch angle, induces considerable main rotor blade downwash and hence more turbulence than when the helicopter is in a low power condition.
5. A slow forward airspeed, typically at speeds where translational lift and translational thrust are in the process of change and airflow around the tail rotor will vary in direction and speed.
6. The airflow relative to the helicopter;
    a. Worst case—relative wind within ±15° of the 10 o'clock position, generating vortices that can blow directly into the tail rotor. This is dictated by the characteristics of the helicopters aerodynamics of tailboom position, tail rotor size and position relative to the main rotor and vertical stabilizer, size and shape. *[Figure 11-9]*
    b. Weathercock stability—tailwinds from 120° to 240° *[Figure 11-10]*, such as left crosswinds, causing high pilot workload.
    c. Tail rotor vortex ring state (210° to 330°). *[Figure 11-11]* Winds within this region will result in the development of the vortex ring state of the tail rotor.
7. Combinations (a, b, c) of these factors in a particular situation can easily require more antitorque than the helicopter can generate and in a particular environment LTE can be the result.

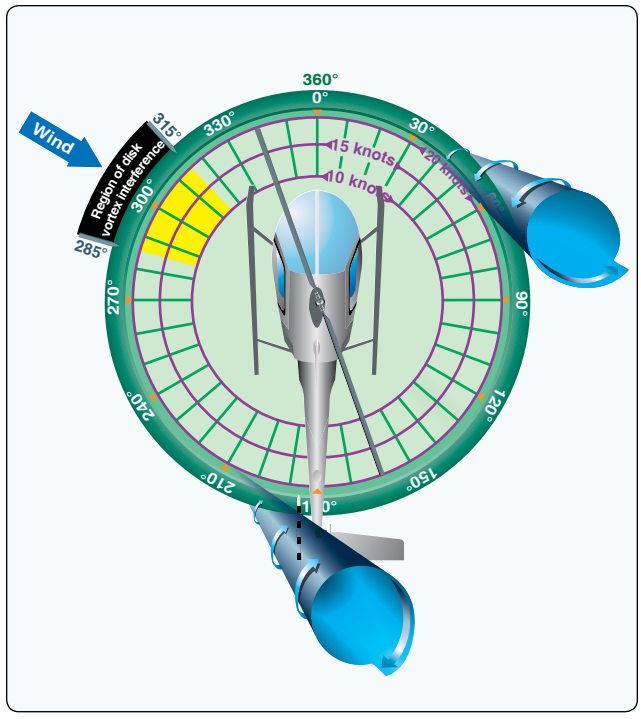

Figure 11-9. *Main rotor disk vortex interference.*

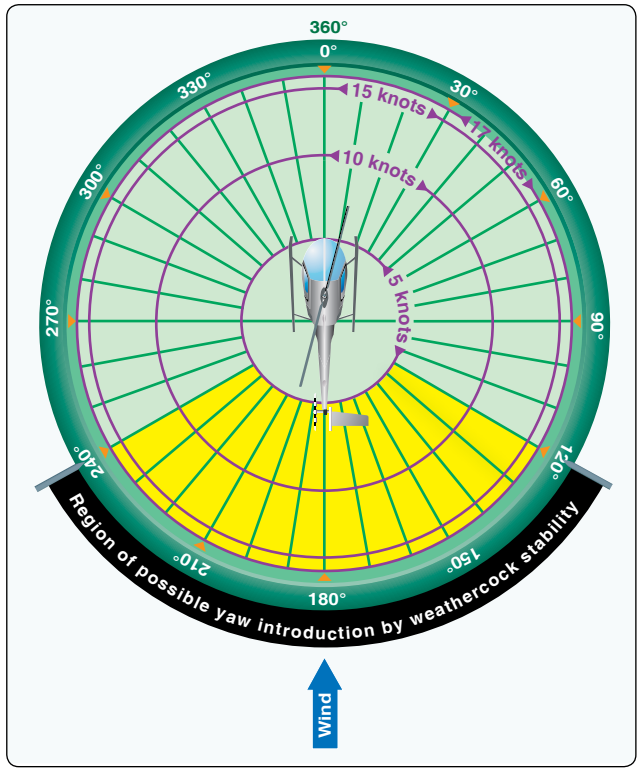

Figure 11-10. *Weathercock stability.*

Certain flight activities lend themselves to being at higher risk of LTE than others. For example, power line and pipeline patrol sectors, low speed aerial filming/photography as well as in the Police and Helicopter Emergency Medical Services (EMS) environments can find themselves in low-and-slow situations over geographical areas where the exact wind speed and direction are hard to determine.