# *Abstract:* A dynamics approach for helicopter rotor-blades

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## Abstract

We present a dynamics model of rotor blades for real-time helicopter simulation. Collisions between the air flow and the moving blades make helicopters fly. In aerodynamics, or even in computer simulations, they precisely analyzed the collisions between the fluid (air) and the solid object (blades), and calculated the differential equations from the collisions. Thus, it was hard for them to generate real-time helicopter motions due to massive computations for calculating the equations. In this paper, we start from a geometric model of rotor blades, which reflects the characteristics of real world blades due to the various factors from helicopter aerodynamics, although some factors should be simplified to show real-time behaviors. Based on this geometric model, we present a dynamics model for calculating the forces due to the rotor blades colliding with air flows. Our dynamics model interprets the collisions between the fluid and the solid objects as the action-reaction forces, as originally Newton did. Finally, we present the force equations suitable for the existing rigid-body simulation systems, instead of fluid-dynamics equations. We implement a prototype system for helicopter motions, and it shows sufficient real-time processing behavior with ordinary PC's.

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