Toroidal Propellers: A Novel Approach to a Quieter Future for Two-Bladed Aircraft

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Exploring toroidal propellers for two-bladed aircraft revealed significant challenges in the design process, notably the absence of a comprehensive mathematical model and insufficient constraints in existing literature. Media surrounding these propellers suggest a quieter alternative to standard propellers, which does appear to be true as shown in this research. However, the most popular design is unsuccessful at surpassing a standard propeller in terms of force per unit of sound. By modifying existing designs and modeling a wing that, rather than rounding off the wing tip completely, acts as a funnel, ducting the back toward the hub of the propeller, the toroidal design is successful at outputting greater force per unit of sound, as well as greater force overall. This research suggests that the toroidal propeller design tested is a strong candidate for reducing noise and increasing efficiency in modern fixed-wing aircraft.

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