

**SANDIA REPORT**

SAND74-0431 UC-261  
Unlimited Release  
Printed October 1975

**THE DARRIEUS TURBINE:  
A PERFORMANCE PREDICTION MODEL  
USING MULTIPLE STREAMTUBES**

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**ABSTRACT**

This report describes a multiple streamtube performance prediction model for the Darrieus turbine. This model is shown to predict the performance of small-scale rotors, for which test data is available, much more accurately than the single streamtube model. The model is capable of predicting the overall rotor power output and the distribution of aerodynamic forces along the rotor blades. The model can be used to study the effects of rotor geometry variations such as blade solidity, blade taper, and variations in rotor height-to-diameter ratios. In addition, spatial variations in freestream velocity such as that produced by atmospheric wind shear can be easily incorporated into the model. This model will assist in the proper design and optimization of large-scale rotors for which test data is not available. Scale effects can be predicted based upon the proper use of high Reynold's number airfoil data.

Prepared by  
Sandia National Laboratories  
Albuquerque, New Mexico 87185 and Livermore, California 94550  
for the United States Department of Energy  
Under Contract DE-AC04-94AL85000