

Abstract Submitted
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Fanning the Optimal Breeze with an Abanico GRACE GOON,
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hand-held fans, or abanicos, are universally employed as cooling devices that are
both portable and sustainable. Their to and fro axial motion about one's hand gen-
erates an airflow that increases the evaporation rate near the skin and refreshes. We
study this problem in the context of fluid-structure interaction, through precision
model experiments. We first characterize the elastic properties of a semi-circular
thin plates with various thickness and evaluate their aerodynamic performance in
a custom built apparatus. The air velocity profile that results from the flapping
motion of the fan is characterized for different driving conditions. A systematic
variation of the geometric and elastic parameters, along with an exploration of the
parameter space of the periodic driving motion (amplitude and frequency), allows
us to establish optimal design and operational conditions for maximal output of the
generated airflow, while minimizing the input power.

Grace Goon
MIT

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