A FIXED-POINT APPROACH
OF A PARACHUTE PROBLEM

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Abstract. The object of this work is to determine the existence of that shape of a parachute, which would cause it to float indefinitely in an ascendant wind stream, even while subject to gravity. A Helmholtz type model is constructed for the unsteady, inviscid, incompressible and potential flow past the parachute. The associated complex potential is determined by making certain reasonable simplifying assumptions and the global action of the fluid (air) on the parachute is evaluated. The existence of a shape of the parachute that would result in its failure, i.e., floating indefinitely, is then determined using a fixed-point technique. A similar conclusion could be get for certain bucket shape of a wind turbine, which leads to its immobility irrespective of the wind stream. This is a problem of practical interest for parachute (turbine) manufacturers, as such a shape should be avoided.
Key Words and Phrases: Helmholtz model for heavy inviscid incompressible flows, parachute in an ascendant wind stream, indefinitely floating parachute, fixed point technique.
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