Rotary Airborne Wind Energy Systems with Ground Based Power Generation: Overview and Practical Experiences

Christof Beaupoil
someAWE.org

Rotary airborne wind energy systems that use rotors similar to conventional wind turbines and ground based generators combine some of the known benefits of crosswind kite power systems with potential additional benefits such as continuous energy generation and passive control.

The author provides an overview of rotary designs in literature and practice. This includes different methods for power transmission (torsion, reel in/out, etc.), rotor designs (rigid blades, soft wings, number of blades, stacked rotors, etc.), hub designs (fixed vs variable pitch) and cheap sources for lift and passive control.

Airborne wind energy systems without crosswind motion typically have a bad power/blade area ratio. The author discusses a rotor design that can alleviate this disadvantage. It treats the blades of the rotary wing as independent airborne wings that are only connected for easier control and launch. The airfoils start at some distance from the hub thus achieving high tip speeds with smaller blade area than conventional rotors.

Practical experiences with a torsion based rigid blade rotary airborne wind energy system are being shared. The author discusses the design rationale, lessons learned, successes and dead ends [1,2,3].

References: