K.mod.E. Kite

BACKGROUND

The K.mod.E. kite has such a high lift/drag coefficient that it flies directly overhead with the line absolutely vertical (almost) and as it has all the 3 dimensional stability of an aircraft it can be flown as a glider. The kite generates 2 vortices and then degenerates the 2 vortices to create lift with efficiency and stability, hence the concave or depressed diamond shape. The kite was called K.mod.E. (Kettlewell's modified Eddy) as it started life as a modification of an Eddy kite, the longitudinal spine is bowed as well as the lateral spar. It was designed for Rachel Cannon in May 1988 and was subsequently made by Mathematics Students at Bradford University in 1993/1994 and by Steve and Peter Pryszlak and Suzanne Whittaker in 1993/1994 so it is tried and tested, it is probably the most aerodynamically advanced and most aerodynamically efficient kite in the world and the only true stealth kite and stealth glider/aircraft.

SCIENCE

The leading surfaces are a positive delta positively inclined to the airflow thereby generating 2 vortices, the intense low pressure of which creates maximum lift, while the outward airflow at the surface creates minimum drag, resulting in a maximum lift/drag coefficient. The trailing surfaces are a negative delta negatively inclined to the airflow thereby degenerating the 2 vortices so that the kite does not trail vortices, resulting in maximum aerodynamic efficiency. The surfaces' dihedral creates longitudinal and lateral stability while the surfaces' overbalance creates directional stability, 3 dimensional stability.

DESIGNS

Designs Mk.0 to Mk.9 show improvements to the concave or depressed diamond shape with the Mk.0 being the most basic design, the Mk.1 being the simplest design, the Mk.2 to Mk.7 being improvements to the design, the Mk.8 being the most advanced design and the Mk.9 being the aircraft design.

K.mod.E. Mk.0 (Basic principle)

The kite design is very simple being any concave or depressed shape, for example, an upside down umbrella. But something resembling a typical diamond shape is probably the best performer as it is 2 deltas placed back to back, a positive delta positively inclined and a negative delta negatively inclined.

K.mod.E. Mk.1 (Simplest)

Based on the Mk.0 and the easiest to make, is a typical diamond shaped kite like the Eddy kite but with both the longitudinal spine and the lateral spar bowed upwards about 15% so that the kite resembles an upside down umbrella. The bowing is accomplished by taut lines as on an Eddy kite. The widest point, the line attachment point and ideally the minimum point should be coincident at about the 33% position measured from the front, there is no need for a bridle on the kite. The sail width should be shorter than the sail length and it should be taut and if possible wrinkle free.

K.mod.E. Mk.2 (Better)

As the Mk.1 except the bowing is accomplished by a taut perimeter line or better still by the taut sail itself, either way the bowed longitudinal spine and the bowed lateral spar tension the sail keeping it taut.

K.mod.E. Mk.3 (Possibly the best)
The longitudinal spine is bowed upwards as on the Mk.1 and Mk.2 but the lateral spar is moved to the front where it is bowed backwards to the widest point, this streamlines the sail and the leading edge lateral spar making the kite more aerodynamically efficient. The sail trailing edge is curved inwards to an apex at the back to complement the curved leading edge.

K.mod.E. Mk.4 (Back to basics)
As the Mk.3 except the leading and trailing edges. 2 straight leading edge lateral spars form a delta and straight sail trailing edges form an inverted delta making the kite diamond shaped like the Mk.1 and Mk.2 but more aerodynamically efficient.

K.mod.E. Mk.5 (Finer points)
The longitudinal spine and the leading edge lateral spar(s) are tapered to a point making the structure stronger, lighter and more aerodynamic, also, the longitudinal spine and the leading edge lateral spar(s) are a 'D' section with the curve facing forward on the leading edge lateral spar(s) and the curve facing upward on the longitudinal spine for maximum aerodynamic efficiency.

K.mod.E. Mk.6 (Hovercraft principal)
The sail is a diffuser being perforated and therefore porous, to allow air to flow from high pressure below the sail to low pressure above the sail. Consequently the 2 vortices spin on a cushion of air and therefore spin more freely with less drag.

K.mod.E. Mk.7 (Practicalities)
If the longitudinal spine and the leading edge lateral spar(s) are telescopic or made of connecting sections the kite can be made very large and still be transportable in a bag. The sail can be made of heat shrink material thereby ensuring it is drum tight and wrinkle free. Although the kite is designed as a mono line, 2 or more control lines could be fitted.

K.mod.E. Mk.8 (Ultimate)
Stronger than Steel, Kevlar membrane for the sail and lighter than Magnesium, Carbon fibre rods for the longitudinal spine and the leading edge lateral spar(s). To give the perfect streamlined shape, the plan shape is 4 of Concorde's delta wings placed back to back with length ratio 1:2 and the side elevation shape is 2 of Concorde's delta wings placed back to back with length ratio 1:2.

K.mod.E. Mk.9 (Aircraft)
As an aircraft, the vortices could operate as heat engines using Archimedes principle - hot air in the outer region becomes buoyant and goes down the pressure gradient towards the centre converting heat energy into kinetic energy propelling the aircraft forward, and/or external engines could operate underneath the rear portion of the aircraft - the pressure of hot air acting against the inclined surfaces propelling the aircraft forward, either way the engines have no mechanical moving parts being purely aerodynamic. Also, the surfaces being inclined and diamond shaped makes it the perfect stealth aircraft.