vertical rotor 118 individually with the vertical rotor 118 positioned at different *p* values.

The ratio of the lift coefficient determined with the combination of fixed wing 102 and vertical rotor 118, $C_{L\,new,}$ to the lift coefficient determined with sum of lift produced by the fixed wing 102 and vertical rotor 118 individually, C_L, measures the synergistic lift.

Figure 3 illustrates a contour plot of the variation in the synergistic lift in a lift assembly with variation in the position of the rotor and angle of attack at a wing chord of 48 cm and rotor speed of 6500 RPM in an embodiment of the present subject matter. It can be observed from the Fig. 3 that the total lift produced by the fixed wing 102 and running vertical rotor 118 combined system was more than the summation of lift produced by the fixed wing 102 and the vertical rotor 118 individually, leading to synergistic lift. Further, the ratio varies with the value of p and angle of attack at a wing chord of 48 cm and rotor speed of 6500 RPM, giving a maximum of about 20. A 20-fold increase shows the effectiveness of using an appropriately designed lift assembly with a running rotor during forward flight.

Hence to improve the lift of an aerial vehicle, a lift assembly 300 comprising a fixed wing 102 and at least a vertical rotor 118 positioned so as to increase the lift forces when operational is designed.

The lift assembly 300 is designed such that the variables of the lift assembly 300 are optimized. The value of *p* at which the lift assembly 300 produces maximum lift is dependent on the operational RPM of the vertical rotor 118, the chord 117, and the angle of attack 116. Hence the chord 117, the placement distance 122, operational RPM of the vertical rotor 118 and the angle of attack 116 are optimized to obtain a lift assembly 300 with increased lift force. To this end, CFD simulations are performed for a given chord 1m, operational RPM of the vertical rotor at 70 % throttle and the angle of attack 0 degree and the rotor being positioned at various locations around the wing along the x and y directions with a fixed z axis placement of 0 m. The lift force produced in N produced is presented in Table 1.