Dr Kalam- My Reminiscences

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The beautiful mind and noble soul of Dr Kalam has touched the hearts and inspired the lives of millions of individuals, young and old, and rich and poor; and I had the opportunity to be one of those many.

In February 1973, soon after receiving PhD degree from Indian Institute of Technology Kanpur, I joined Aerodynamics Division of the SSTC Thiruvananthapuram to work in the Ionospheric Aerodynamics field. I started the search for a suitable lodge to stay; and finally got a room in the Indra Bhavan lodge at the Statue area; and here I stayed for six years until 1979. Soon I came to know that the famous Project Director of SLV-3 also stayed in the same lodge. There on the steps of Indra Bhavan, every morning, as I went out to take my bus to Veli, I used to see the great Dr Kalam waiting for his vehicle to come. At that time, essentially the entire activities of all Divisions of SSTC used to be centered on various contributions to the SLV-3 launch vehicle project, led by Dr Kalam.

Soon I was hurled into a direct orbit around Dr Kalam, after a swing-by at August 1973 Symposium on Space Science & Technology conducted at Trivandrum by the Astronautical Society of India, then known as the Indian Rocket Society (IRS).There it was pointed out by an IISc Professor, Dr SK Shrivatsava, that we must use methods of trajectory optimization for SLV-3. I was assigned the task to look into this problem. This being a new area for us, in his characteristic style, Dr Kalam had inspired also Dr Vathsal and Prof Shrivatsava to study this problem in detail. The two years of 1974 and 1975 saw intense activity in this area. On 23rd June 1975 Kalam sent out a note marked to C L Amba-Rao, S C Gupta, M C Mathur and R M Vasagam*: "As has been discussed in Design Review Meetings, three different approaches have been made towards the optimization of pitch program for SLV-3. Dr V Adimurthy, Dr S Vathsal and Dr S K Shrivastava will present the work carried out and the results of the studies on 24th June at 1430 hours at SSTC Conference Hall. You may kindly participate in the discussions and offer your recommendations"*. No decision was made in this review. Meanwhile, I published an extended formulation on trajectory optimization in the *Journal of Spacecraft and Rockets* of AIAA January 1976 issue. Dr Kalam sent to me a note written on 30 November 1976: *"Adimurthy, May I congratulate you for the publication of your work"*. By December 1976, after a review in the presence of Chairman ISRO, Prof Dhawan, Dr Kalam took the decision to accept the trajectory optimization method I developed for SLV-3.

In 1979, when I sought leave from the centre to take up post Doctoral research on non-equilibrium reentry flow fields under an award from Humboldt Foundation, Dr Kalam, who by then took over as Director of Aeronautics Group and became our direct boss, set a condition for

me to go; before I go to Germany I must complete the development of pitch and yaw trajectory optimization for our future launch vehicle PSLV, and fully document it; which I dutifully completed. While I was in Germany researching on non-equilibrium reentry flows, the first flight of SLV-3, SLV-3 E-01, took place on August 10, 1979; and the German TV and media evinced keen interest on this event. With my steering program on board the vehicle, I had the urge to be in touch, so I sent a telegram to Kalam: *Participating from Germany in the exciting Launch, Adimurthy*. T S Prahlad, who was then Head ARD, wrote to me later: "*Because of a problem in the second stage control system, the payload injection could not be achieved. The centre is making all efforts to have the next flight in June 1980, and make it a total success"*. He sent the draft letter to Kalam for clearance and Kalam added by hand in between the sentences: *Out of 44 subsystems, 34 have worked well.* On return from my study leave, I rejoined VSSC on 10th July 1980 and immediately proceeded to SHAR for the grand launch on 18th July. While in SHAR, I happened to talk with Dr Kalam and he remarked*: Do you know what your German professor thinks of you, he wrote very highly about you.* After the launch, I went to the SLV Project office, and I saw that the telegram I sent almost a year before was still displayed on the notice board with a note from Dr. Kalam.

Time has come for Dr Kalam to move to DRDO as Director. Prior to that Dr Kalam had done some preliminary mission and trajectory analyses for earth impact delivery systems; and I was given a special assignment do trajectory optimization of such systems (here range optimization or error minimization). This was done with due secrecy and under oath; I had to destroy all papers and results connected with this work. Later after Dr Kalam moved to DRDO, many a time he had invited us to review the work initiated there. I am happy to note that the young scientist, whom I initiated and groomed there in the area of trajectory optimization, received Padma Award in 2015 for his contributions in flight system dynamics.

Later Dr Kalam moved over to take up the highest office in the country; and my opportunities to interact with him continued. As a member of one such delegation to meet him at the Rashtrapathi Bhavan, I happened to ask him some question; and to my great surprise, he said : "Buddy, come with me" and took me to his private chamber and there on his personal computer explained to me through a power-point presentation what he had in his mind.

The last phase of my interactions with Dr Kalam continued until recently, when I worked as Dean R&D of Indian Institute of Space Science and Technology; of which Dr Kalam was the Venerable Chancellor. I had the opportunity to meet him at his residence in Delhi to apprise him of the Research and Development activities at IIST. During his regular visits to IIST, with great interest, he would inquire about the progress of our Mars Orbiter Mission.

As we pay our respects and homage to one of the greatest personalities that tread our home land Earth, I am sure his noble soul will continue to lead us with a kindly light and take us to a harmonious world; into that heaven of freedom, where strength respects not only strength; but strength respects weakness also; and where every individual's journey of life is happy and purposeful.