

Editorial

Commemorative Issue of Defence Science Journal on DRDO@60

Defence Research and Development Organisation (DRDO), was set up on 1 January 1958 as a small organisation with only 10 laboratories with the amalgamation of the then already functioning Technical Development Establishments (TDEs) of the Indian Army and the Directorates of Technical Development and Production (DTD&P) with the Defence Science Organisation (DSO). Over the years, DRDO has seen multi-directional growth in its charter and projects.

Today, after 60 years of its existence, DRDO is one of the leading R&D organisations in the world with a network of more than 56 laboratories engaged in developing defence technologies. These laboratories are involved in design, development and integration and production in areas of aeronautics, armaments, combat vehicles and engineering, electronics and computer sciences, combat vehicle, advance computing and simulation, special materials, missiles, naval systems, and life sciences.

DRDO has made the country proud through a string of achievements in making India self-reliant in a number of critical technologies, strategic defence weapons and delivery systems, and array of battle field systems like Light Combat Aircraft Tejas, Main Battle Tank Arjun, and range of missile series such as Agni, Prithvi, Akash, Nag, and BrahMos.

The DSO Science Policy Board, in the beginning of 1949, approved the publication of a journal exclusively devoted to Defence Science. In pursuance of this, the first issue of *Defence Science Journal* (DSJ) appeared in July 1949. The Journal in the beginning started as half-yearly, but it was made a quarterly journal from volume 2 (1952), in 1951 journal was not published. For initial eight volumes (from 1949 to 1958), the Journal was classified as Restricted. To widen its scope and circulation, in 1959 it was made an open publication. From 2007 onwards Journal is made bi-monthly.

This issue of DSJ is a commemorative issue on the DRDO@60 includes papers authored by scientists of DRDO highlighting some of the achievements in technologies developed by various laboratories of DRDO. More than 90 papers were received for this Issue, and after peer evaluation due to limitation in number of papers in each issue, 15 papers have been selected for inclusion in the present Issue. Remaining peer-reviewed accepted papers would be included in the future issues of DSJ.

In the field of aeronautics, Anandhanarayanan, and co-authors from DRDO-Defence Research and Development Laboratory, Hyderabad, in their article, 'Separation dynamics of air-to-air missile and validation with flight data' discussed about an indigenous store separation dynamics suite which was

developed and applied to separation dynamics studies of an Air-to-Air Missile from a fighter aircraft.

In the field of armaments, the paper of Venkatesan from DRDO-Research & Innovation Centre, IIT Madras, Chennai, in his article, 'Ab initio studies on the interaction between Copper(I) and 5-Nitrotetrazolate Anion' reported Ab initio molecular orbital calculations on the interaction between Copper(I) and 5-nitrotetrazolate anion were done using different basis sets, at the HF, B3LYP and MP2 levels of theory.

In the field of combat vehicles and engineering, the paper of Rahman, and co-authors from DRDO-Combat Vehicles Research and Development Establishment, Chennai, on 'A design of experiments methodology for evaluating configuration for a generation next main battle tank' observed that the revolutionary design configuration fares better compared to the evolutionary design configuration with a combat mass of only 41 t. Patel and Rokade from DRDO-Vehicles Research and Development Establishment, Ahmednagar, in their article, 'Topology optimisation and fabrication aspects for light weight design of an articulating beam of article launching system' study highlights problem formulation with solid isotropic material with penalisation optimisation technique. Ramamurthy, and co-author from DRDO-Combat Vehicles Research and Development Establishment, Chennai in collaboration with SRM University, in their article, 'Ergonomic level improving of armoured fighting vehicle crew' A mathematical model of the AFV-occupant composite system is developed, analysed by simulation study and validated.

In the field of computers & systems studies, the paper of Bisht, and co-author from DRDO-Institute for Systems Studies and Analyses, Delhi, in their article, 'Command agent belief architecture to support commander decision making in military simulation' discussed on the complexity of warfare in the battlefield. Ravishankar, and co-authors from Defence Institute of Advanced Technology, Pune in collaboration with DRDO-Institute for Systems Studies and Analyses, Delhi, in their article, 'A game theoretic software test-bed for cyber security analysis of critical infrastructure' has proposed a model to assess the vulnerabilities of own networks against adversarial attackers, where the adversary's perception of strengths and vulnerabilities are modelled using game theoretic techniques.

In the field of electronics, the paper of Ramkumar and Sudhendra from Aeronautical Development Establishment, Bengaluru, in their article, 'Novel ultra wide band polarisation independent capacitive jaumann radar absorber' has presented the four layers jaumann absorber and capacitive jaumann absorber. Kumaraswamy Rao (ex-DRDO scientist), and co-

authors from Bharat Institute of Engineering and Technology, Hyderabad, in their article, 'Networking of tracking radars of two different SAM weapons to protect the missile in intensive jamming environment' has proved through mathematical computations that SA-125 low-blow tracking radar of Pechora is vulnerable to jamming.

In the field of material sciences, the paper of Savio and Madhu from DRDO-Defence Metallurgical Research Laboratory, Hyderabad, in their article, 'Methodology to measure the protective areal density of ceramic tiles against projectile impact' have evaluated the ballistic performance of hot pressed boron carbide tiles, using the protective areal density test method, against hard steel armour piercing projectiles. Tripathi and co-author from DRDO-Defence Research and Development Establishment, Gwalior, in their article, 'Activated carbon fabric: an adsorbent material for chemical protective clothing' have reviewed the recent advances and developments in the field of ACF and their utility as an adsorbent material in various fields including NBC scenario. Gupta, and co-authors from Indian Institute of Technology, Madras, Chennai in association with DRDO-Research & Development Establishment (Engineers), Pune, in their article, 'Comparative study of damping in pristine, steel, and shape memory alloy hybrid glass fiber reinforced plastic composite beams of equivalent stiffness' studied damping characteristics of SMA hybrid composite beams by evaluating

damping ratio of cantilever beam and compared them with pristine GFRP beam. Srivastava and co-author from DRDO-Defence Materials and Stores Research and Development Establishment, Kanpur, in their article, 'Synthesis of silver nanostructures and their application in highly sensitive SERS Sensors' have presented the synthesis of silver nanostructures with different morphologies using polyol reduction method and compared their SERS activity for different analytes.

In the field of naval system, the paper of Anand and Hareesh Kumar from DRDO-Naval Physical and Oceanographic Laboratory, Kochi, in their article, 'Influence of bathymetry on the performance of regional scale model' highlights the choice of fine resolution bathymetry data in the simulation of nearshore processes, where bathymetry is very complex. Kumar and Anjaneyulu from DRDO Integration Centre, Panagarh in collaboration with NIT Warangal, in their article, 'Design and development of redeployable underwater data communication link for defence application' have carried out testing of underwater system from submersible platform at specified depth.

Defence Science Journal thanks all the contributors and reviewers for their contributions in bringing out this issue. I hope readers of the Journal will enjoy the content of current issue and contribute their high quality research work to make it an eminent resource for defence scientists and researchers.

(Alka Suri)
Editor-in-Chief