Mr. Shyam Sundar Santra, DST – INSPIRE Fellow, SRF

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Details of the funding agency/ scheme	Department of the Science and Technology, New Delhi, India. Letter No. DST/INSPIRE Fellowship/2014/140. Dated: 15th Sept. 2014
Title of the research topic	Study of oscillatory and asymptotic behaviour of solutions of impulsive neutral differential equations
Abstract of the research work (max. 300 words)	The objective of this research work is to study the oscillatory, nonoscillatory and asymptotic behavior of the following impulsive differential systems: 1) $\big(y(t)+p(t)y(t-\tau)\big)'+q(t)G\big(y(t-\sigma)\big)=0,\ t\neq\tau_k,\ k\in\mathrm{N}$ $\Delta\big(y(\tau_k)+p(\tau_k)y(\tau_k-\tau)\big)+r(\tau_k)G\big(y(\tau_k-\sigma)\big)=0,\ k\in\mathrm{N}.$

	2) $\left(y(t)+p(t)y(t-\tau)\right)'+q(t)G\left(y(t-\sigma)\right)=f(t),\quad t\neq\tau_k,\ k\in\mathrm{N}$ $\Delta\left(y(\tau_k)+p(\tau_k)y(\tau_k-\tau)\right)+r(\tau_k)G\left(y(\tau_k-\sigma)\right)=g(\tau_k),\ k\in\mathrm{N}.$ 3) $\left(r(t)\left(y(t)+p(t)y(t-\tau)\right)'\right)'+q(t)G\left(y(t-\sigma)\right)=0,\quad t\neq\tau_k,\ k\in\mathrm{N}$ $\Delta\left(r(\tau_k)\left(y(\tau_k)+p_k y(\tau_k-\tau)\right)'\right)+q_k\,G\left(y(\tau_k-\sigma)\right)=0,\ k\in\mathrm{N}.$ 4) $\left(r(t)\left(y(t)+p(t)y(t-\tau)\right)'\right)'+q(t)G\left(y(t-\sigma)\right)=f(t),\quad t\neq\tau_k,\ k\in\mathrm{N}$ $\Delta\left(r(\tau_k)\left(y(\tau_k)+p(\tau_k)y(\tau_k-\tau)\right)'\right)+h(\tau_k)\,G\left(y(\tau_k-\sigma)\right)=g(\tau_k),\ k\in N.$ 5) $\left(y(t)-ry(t-\tau)\right)'+qy(t-\sigma)=0,\quad t\neq\tau_k,\ k\in\mathrm{N}$ $\Delta\left(y(\tau_k)-ry(\tau_k-\tau)\right)+py(\tau_k-\sigma)=0,\ k\in\mathrm{N}.$ 6) $\left(y(t)-ry(t-\tau)\right)''+qy(t-\sigma)=0,\quad t\neq\tau_k,\ k\in\mathrm{N}$ $\Delta\left(y(\tau_k)-ry(\tau_k-\tau)\right)'+py(\tau_k-\sigma)=0,\ k\in\mathrm{N}.$ 7) $\left(y(t)-p(t)y(t-\tau)\right)'+q(t)y(t-\sigma)=0,$ $\Delta y(t_k)=y(t_k^+)-y(t_k)=b_k y(t_k),\quad k=1,2,3,\ldots$ $\Delta y(t_k-\tau)=y(t_k^+-\tau)-y(t_k-\tau)=b_k y(t_k-\tau),\quad k=1,2,3,\ldots$

Progress of the research work	All the proposed works have been completed and the thesis of the Ph.D. work has been ready to submit. At the same time, Govt. of India and British Govt. selected me to work at University of Exeter, Exeter, South West England, London, England during June - December 2018 through Newton Bhabha Ph.D. placement programme fund. As per the guidelines of the programme I will submit my Ph.D. thesis after the end of the programme.
Journal publication (International)	**(2017)** **1.** A. K. Tripathy and **S. S. Santra**; *Characterization of a class of second order neutral impulsive systems via pulsatile constant*, Differential Equations and Applications, Vol. 9, No. 1 (2017), pp. 87-98. **2. S. S. Santra;** Necessary and sufficient conditions for oscillation of solutions of nonlinear second order differential equations, Romanian Journal of Mathematics Computer Science., Vol. 7, Issue 2 (2017), pp. 80-85. **3. S. S. Santra;** Oscillation analysis for nonlinear neutral differential equations of second order with several delays, Mathematica, Tome 59 (82), No. 1-2 (2017), pp. 111-123. **(2016)** **4.** A. K. Tripathy and **S. S. Santra;** P*ulsatile constant and characterisation of first order neutral impulsive differential equations*, Communication in Applied Analysis 20 (2016), pp. 65-76. **5. S. S. Santra;** *Existence of positive solution and new oscillation criteria for nonlinear first-order neutral delay differential equations*, Differential Equations and Applications, Vol. 8, No. 1 (2016), pp. 33-51. **6. S. S. Santra;** *Necessary and sufficient condition for oscillation of nonlinear neutral first order differential equations with several delays*, Mathematica, Tome 58 (81), No. 1-2 (2016), pp. 85-94. **7.** A. K. Tripathy, **S. S. Santra** and S. Pinelas; *Necessary and sufficient condition for asymptotic behaviour of solutions of a class of first order impulsive systems***,** Advances in Dynamical Systems and Applications, Vol. 11, No. 2 (2016), pp. 135-145.

	8. A. K. Tripathy and **S. S. Santra;** *Oscillation properties of a class of second order impulsive differential systems of neutral type*, Functional Differential Equations, Vol. 23, No. 1-2, (2016), pp. 57-71. **(2015)** **9.** A. K. Tripathy and **S. S. Santra;** *Necessary and sufficient conditions for oscillation of a class of first order impulsive differential equations*, Functional Differential Equations, Vol. 22, No. 3 - 4, (2015), PP. 149–167. **10. S. S. Santra;** *Oscillation criteria for nonlinear neutral differential equations of first order with several delays*, Mathematica - Tome 57 (80), No. 1-2 (2015) , pp. 75-89.
Conference attended	1. Attended and presented a paper in "International Conference on Mathematical Applications in Engineering and Technology (ICMA-2017)" held at PG and Research Department of Mathematics, Sacred Heart College, Vellore District, Tamilnadu, INDIA during 27th – 28th January, **2017**. 2. Attended and presented a paper in "82th Annual Conference of the Indian Mathematical Society" held at Kalyani University, West Bengal, INDIA during 27th - 30th December, **2016**. **3. Delivered a talk in "International Conference of Numerical Analysis and Applied Mathematics 2016 (ICNAAM 2016)" held at Rodos Palace – Conference Centre, Rhodes, GREECE, during September 19 – 25, 2016, funded by SERB (DST) – Govt. of India.** 4. Attended "Advance Lavel Training Programme-2016" of "National Programme on Differential Equations: Theory, Methods and Applications (NPDE-TCA)" held at Bits-Pilani, Hyderebad Campus, INDIA during 25th May, 2016 - 14th June, **2016**. 5. Attended and presented a paper in "81th Annual Conference of the Indian Mathematical Society" held at VNIT, Nagpur, Moharastra, INDIA during December 27-30, **2015**.

	6. Attended and presented a paper in "80th Annual Conference of the Indian Mathematical Society" held at Indian School of Mines, Dhanbad, Jharkhand, INDIA during December 27-30, **2014**.
Awards	**1. Awarded the Newton Bhabha Ph.D. Placement Programme fund to work at University of Exeter, Exeter, South West England, London, UK for four months of 2018 funded by Department of Science and Technology, New Delhi, Govt. of India and British Govt. As per the funding arrangement of the programme, DST will cover Visa fees, Economy class international airfares and overseas medical insurance and British Govt. will cover in-country costs including accommodation and monthly stipend.** 2. Awarded Senior Research Fellow by Department of Science and Technology, New Delhi, Govt. of India in the year May, 2016. 3. Awarded Junior Research Fellow by Department of Science and Technology, New Delhi, Govt. of India in the year May, 2014. 4. Awarded the INSPIRE Fellowship by Department of Science and Technology, New Delhi, Govt. of India in the year May, 2014. 5. Awarded Gold Medal in Mathematics for scoring the first class first in M.Sc. Mathematics (2010-2012) from Sambalpur University.