Department of Mathematical Sciences

Report on research collaboration

Prof. Milan Nath, Dr. Debajit Kalita, (along with Mr. Deepak Sarma Research Scholar), Department of Mathematical Sciences, Tezpur University

and

Prof. R. B. Bapat, Stat-Math Unit, ISI Delhi

Title of collaboration:

Convex and quasiconvex functions on trees and their applications

Summary of collaboration:

A collaborative research work was undertaken by Prof. R.B. Bapat, Dr. Milan Nath, Dr. Debajit Kalita and Mr. Deepak Sarma with the aim to introduce and study the Convex and quasiconvex functions on trees and their applications. It was proved that for a tree the eccentricity, transmission and weight functions are strictly quasiconvex. It was shown that the Perron vector of the distance matrix is strictly convex whereas the Perron vector of the distance signless Laplacian is quasiconvex for a tree. In the class of all trees with a given number of pendent vertices, we proved that the distance Laplacian and distance signless Laplacian spectral radius are both maximized at a dumbbell. It was proved that among all trees with fixed maximum degree broom is the unique tree that maximizes the distance Laplacian and distance signless Laplacian spectral radius. We supplied the unique graph that maximizes the distance spectral radius in the class of all unicyclic graphs of fixed girth and number of vertices. Furthermore, we obtained the unique graph that maximizes the distance signless Laplacian and the distance Laplacian spectral radius in the class of all unicyclic graphs on $\mathbf{n}$ vertices.

The collaboration was in both offline and online mode with exchange of ideas.

Duration of collaboration:

The collaboration started in the month **September, 2015** and culminated in the form of a published research paper in the month of **July, 2017**. During the collaboration **Prof. Bapat** visited the Department of Mathematical Sciences, Tezpur University for a period of 10 days starting from **27 September 2015** to **07 October, 2015.**

Details of collaboration:

Details of collaboration could be found in the article-

Convex and quasiconvex functions on trees and their applications, Linear Algebra and its Applications, 533 (2017), 210-234.

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