

CIMPA Research in Pairs (report)

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I. Information

*Name: **Prof Ramjiwari***

*First name: **Ramjiwari***

*Home Institution: **Indian Institute of Technology Roorkee, India***

*Total duration of the stay: **May 15, 2025 to July 18, 2025***

*Host colleague (first name, last name, city, country): **Prof Andrea Cangiani, SISSA, Trieste, Italy***

II. Activity Report

I really enjoyed my research work during my stay at SISSA, Trieste, Italy with Prof Andrea. We did many meetings and conclude some good results. The brief activities report is as follows:

(i) Research work done: We worked on the proposed problem KdV-RRLW model by constructing mixed finite element method. In this construction, we introduce the Laplacian of the solution as a new explicit variable and convert the problem into decoupled form. A primary aspect of this work is employing a mixed approach to eliminate difficulties arising when constructing the finite element subspace of $H^2(\Omega)$ (in case we use the continuous Galerkin method). This work provides some new types of error estimates in different Banach spaces. It establishes that the numerical solution of the proposed method converges to the exact solution with the optimal order under the H^1 norm and the newly introduced variable converges to the exact solution in the L^2 norm. Finally, we confirm the theoretical findings using various examples and present a comparison with other. Soon we will submit the work for publication in a good journal.

(ii) Future scopes: We (Indian PI and Italian PI) are trying to organize a workshop in India on the higher order finite element methods and soon submit the proposal of the workshop. Second, we are planning another proposal for a research project in EU agencies. Hope soon we can take a student in joint collaboration. Please find some photos on the next pages.

III. Feedbacks

I have following observations about accommodation and visa:

(i) Accommodation: The accommodation cost should be given according to short time since during peak time of summer, accommodation become very costly and not easy to get. I think the agency should help a little to get accommodation.

(ii) Visa: In some countries, there are too long queues for visa. I think the agency should arrange the appointment of visas in those countries.



