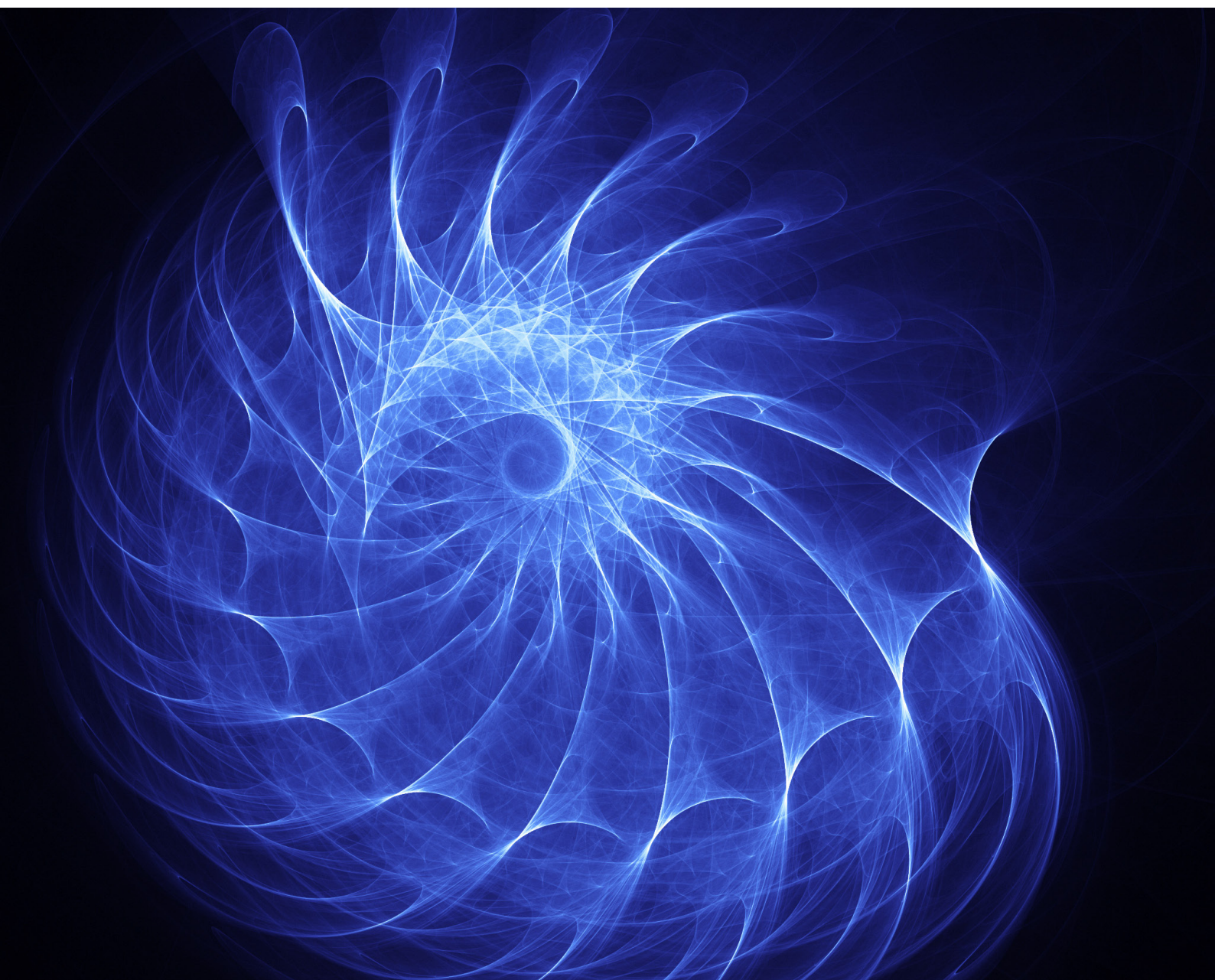


# The Second International Conference on Mathematics and Statistics | AUS-ICMS'15

## Book of abstracts

April 2–5, 2015

In cooperation with



## WELCOME NOTE

*From the organizing chair*

The Department of Mathematics and Statistics at the American University of Sharjah welcomes you to the Second International Conference on Mathematics and Statistics (AUS-ICMS'15). Five years have passed since we hosted the inaugural AUS-ICMS, which was the first conference in the region organized in cooperation with the American Mathematical Society (AMS). It attracted members of the mathematical community from 45 countries who joined together to present, discuss, promote and disseminate research in every field of mathematics, statistics, and their applications. With the same objective, the Second International Conference on Mathematics and Statistics has, once again, attracted nearly 250 mathematicians and statisticians, who join the conference from nearly 50 countries.

In addition to keynote lectures delivered by renowned mathematicians and parallel sessions in all areas of mathematics and statistics, the scientific program of this year's conference includes special sessions in: commutative algebra, algebra and co-algebras, codes and graphs, number theory, financial mathematics and probability, mathematics in biology and medicine, and topology. It is an honor to see so many distinguished researchers gathered here at this conference to present and discuss the latest developments in these fields.

Special issues of two journals: *Springer Proceedings in Mathematics & Statistics* (PROMS) and *Palestine Journal of Mathematics* (PJM) are dedicated to publishing selected papers presented at the conference. The conference program also includes a range of social activities giving you the opportunity to experience and imbibe the local culture and make your stay in Sharjah and the surrounding area a truly enjoyable experience.

On behalf of the conference organizing committee, I would like to express my gratitude to the American University of Sharjah - under the auspices of His Highness Sheikh Dr. Sultan Bin Mohammad Al Qassimi, Member of the Supreme Council, Ruler of Sharjah and President of the American University of Sharjah - for the great support throughout the organization of the conference. I would also like to thank the American Mathematical Society for the technical sponsorship it provided for the conference. Sincere thanks and appreciation go to the keynote speakers, special session organizers, members of the international advisory board, session chairs, our sponsors and AUS staff and student helpers for their diligence and support.

Finally, I wish to thank you for your participation in the conference and contributing to its success by sharing your research achievements with other colleagues.

Best wishes for an enjoyable and memorable conference!

Hana Sulieman

Department Head  
Department of Mathematics and Statistics  
College of Arts and Sciences  
American University of Sharjah

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**Keywords:** Discrete homotopy theory, Discrete homology, metric spaces.

1218      **CYCLIC CODES OVER  $\mathbb{Z}_q + u\mathbb{Z}_q$**

**Maheshanand Bhaintwal** and Rama Krishna Bandi  
Indian Institute of Technology Roorkee, India. *mahesfma@iitr.ac.in*

**Abstract:** Cyclic codes are one of the most studied families of linear codes. This is due to their rich algebraic structure and ease of encoding and decoding. Their structure is well known over finite fields and over finite chain rings. Codes over rings have got a lot of attention after the breakthrough paper of Hammons et al, wherein they have shown that some well known nonlinear binary codes with very good parameters are *Gray* images of some linear codes over  $\mathbb{Z}_4$ . Recently some researchers have studied codes over a non-chain extension  $\mathbb{Z}_4 + u\mathbb{Z}_4$ ,  $u^2 = 0$ , of  $\mathbb{Z}_4$ . Yildiz and Karadeniz have studied linear codes over  $\mathbb{Z}_4 + u\mathbb{Z}_4$ , and Yildiz and Aydin have studied cyclic codes over this ring. Recently, Bandi and Bhaintwal have studied cyclic codes over  $\mathbb{Z}_4 + u\mathbb{Z}_4$ .

In this paper, we extend the study cyclic codes to the ring  $R = \mathbb{Z}_q + u\mathbb{Z}_q$ ,  $u^2 = 0$ ,  $q = p^r$ ,  $p$  a prime.  $R$  can be viewed as the quotient ring  $\frac{\mathbb{Z}_q[u]}{\langle u^2 \rangle}$ . It is a local ring with  $\langle p, u \rangle$  as its unique maximal ideal. We have studied the Galois extension rings of  $R$ . A cyclic code of length  $n$  over  $R$  is an ideal of the ring  $R_n = \frac{R[x]}{\langle x^n - 1 \rangle}$ . We present the ideal structure of  $R_n$ .  $R_n$  is in general not a principal ideal ring, and so a cyclic code over  $R$  need not be a principal ideal. We have presented a condition for principally generated cyclic codes over  $R$  to be free. Further, we have determined minimal spanning sets for non-principal cyclic codes over  $R$ .

**Keywords:** Codes over rings, Gray map, cyclic codes.

1221      **ON THE NUMERICAL SOLUTIONS FOR A KIND OF N DIMENSIONAL AND HIGH ORDER PARTIAL DIFFERENTIAL EQUATION**

**Omer Acan** and Yildiray Keskin  
Department of Mathematics, Science Faculty, Selcuk University, Konya  
42003, Turkey. *acan\_omer@selcuk.edu.tr*

**Abstract:** In this study, we will carry out a comparative study between the reduced differential transform method (RDTM), the variational iteration method (VIM) and the homotopy analysis method (HAM). This has been achieved by handling a kind of 2-dimensional and fourth-order partial differential equations called the Kuramoto Sivashinsky equations. Two numerical examples have also been carried out to validate and demonstrate efficiency of the three methods. Furthermore, it is shown that RDTM has advantage over other methods. This method is very effective and simple and could be applied for nonlinear problems.

This work was supported by Turkish Scientific and Technical Research Council (TÜBİTAK) and the Scientific Research Projects (BAP) office of Selcuk University.

**Keywords:** Kuramoto Sivashinsky equations, reduced differential transform method (RDTM), variational iteration method (VIM), homotopy analysis method (HAM).