## Concurrent Sessions 2

### Seminar 9

### The numerical solution of a wind-driven current Oceanography Model using the Sinc-Derivative interpolation method.

*Dr. Abdullah Kenzu, Qatar University*

In this paper, the Sinc-Derivative Collocation method is used to solve an oceanography model. The model describes a wind-driven current with depth-dependent eddy viscosity. The model is developed in both complex velocity and coupled system formulations. In general, the Sinc-based methods excel over traditional numerical methods due to their exponentially decaying errors, rapid convergence and handling problems in the presence of system singularities. Together with these advantages, the Sinc-Derivative interpolation approach utilizes first derivative interpolation, minimizing the numerical errors associated with numerical differentiation. The approximate solutions determined by the Sinc-Derivative technique is shown to be more accurate and efficient than other methods in the literature.

### Seminar 10

### Pi Day Mathematics Competition

*Dr. Hasan Demirkoparan, Carniegie Mellon University, Qatar*

Pi Day is embraced by mathematicians and educators worldwide as an opportunity to celebrate and encourage learning in mathematics. Pi is written in symbol form as the Greek letter π, which represents the ratio of the circumference of a circle to its diameter, an infinite number rounded to 3.14. Pi Day falls on March 14 each year, or 3/14.

CMU-Q introduced the Pi Day Mathematics Competition in 2016 to encourage high school students to explore the fun side of math. In this talk, the outcomes of the four previous competitions will be shared along with its structure, rules and preliminary statistics of the results.

**Seminar 11**

## Additive Splitting Methods for Advection-Diffusion-Reaction Equations

*Raed Marabeh, Qatar University*

In mathematics, partial differential equations (PDEs) are widely used in modeling of many natural and physical processes. The right hand side of PDEs can be often split into two parts. The split can be based on mathematical properties, such as linearization, or based on physical properties, such as advection, diffusion, or reaction. Most PDEs in practice need to be solved using numerical methods. One of the efficient numerical approaches in solving these equations is to treat each term with a separate method, i.e., 2-additive methods.

In this study, a comparison between the performance of the mathematical and physical splitting will be performed by applying a set of linear multistep methods to an advection-diffusion-reaction (ADR) problem. An introduction to a newly developed additive splitting method, which is convenient to the ADR equations, will be presented. Specifically, treating advection, diffusion and reaction with three distinct methods, i.e., 3-additive methods.