Contributed Papers
Communications libres

TAEHAN BAE, University of Regina
Backward Simulation of Correlated Lévy-Negative Binomial Processes for Quantitative Risk modelling

The incorporation of extremal dependence structure is one of the main concerns in quantitative risk modelling especially under abnormal situations such as market failures. The occurrences of these unexpected shocks can be naturally modelled with a multivariate point process. Recent studies on correlated Poisson processes show that backward construction and simulation methods are computationally efficient, and they allow for flexible and extremal correlation structures. In this talk, I will discuss an extension of the backward method to the Lévy-negative binomial process which is an appealing model for over-dispersed count data such as operational losses. The attainable correlation boundaries under the forward and backward approaches will also be discussed.

DENNIS CONTOIS, Native Education College
Colonialism, First Peoples and Adult Basic Education in Canada

Colonialism, First Peoples and Adult Basic Education in Canada – Dennis Contois

Focused research in adult basic education for First Peoples and other marginalized groups in Canada is a recent sociological undertaking and remains largely neglected as a serious area of inquiry in the social sciences. This research examines the impact of colonialism on knowledge acquisition for First Peoples in Canada, and the pedagogical relationship between First Peoples, academic institutions and the Canadian state. Other areas of inquiry include traditional forms of indigenous knowledge acquisition and a brief history of race and ethnicity in adult basic education. The research is significant in that it addresses the inherent difficulties of trying to incorporate and implement reciprocal styles of learning as an alternative to the conventional unidirectional and culturally predominant pedagogy in the educative process for First Peoples in Canada.

SEBASTIAN DOMINGUEZ, Simon Fraser University
Steklov eigenvalues for the Lame operator

The Lame operator models the small deformations of isotropic materials. In this talk we introduce the notion of Steklov eigenvalues for the Lame operator, show existence of a point spectrum of this operator and present a simple numerical scheme to approximate the eigenpairs of this problem.

CHI-KWONG FOK, The University of Adelaide
Twisted K-theory and extended Verlinde algebra

In a series of recent papers, Freed, Hopkins and Teleman put forth a deep result which identifies the twisted K-theory of a compact Lie group G with the representation theory of its loop group LG. Under suitable conditions, both objects can be enhanced to the Verlinde algebra, which appears in mathematical physics as the Frobenius algebra of a certain topological quantum field theory, and in algebraic geometry as the algebra encoding information of moduli spaces of G-bundles over Riemann surfaces. The Verlinde algebra for G with nice connectedness properties has been well-known. However, explicit descriptions of such for disconnected G are lacking. In this talk, I will discuss the various aspects of the Freed-Hopkins-Teleman Theorem and partial results on an extension of the Verlinde algebra of a simply-connected compact Lie group arising from a disconnected Lie group. The talk is based on work in progress joint with David Baraglia and Varghese Mathai.

DARYL FUNK, Douglas College
On representing matroids by matrices and graphs: two sides of the same coin

Matroids provide a combinatorial abstraction of the notion of dependence, analogous to the way groups abstract symmetry and topologies abstract continuity. Two fundamental classes of matroids are those that can be represented as a matrix over a field and those that can be represented as a biased graph. Those matroids with a representation of both types have a central role in matroid structure theory.

Let M be a 3-connected matroid and let $\mathbb{F}$ be a field. Let A be a matrix over $\mathbb{F}$ representing M and let $(G, \mathcal{B})$ be a biased graph representing M. Is there any relationship between the matrix and the graph? Yes! A is projectively equivalent to a canonical matrix representation of M arising from G as a gain graph over the additive or multiplicative group of $\mathbb{F}$. Further, the projective equivalence classes of matrix representations of M are in one-to-one correspondence with the switching equivalence classes of gain graphs arising from $(G, \mathcal{B})$.

This is joint work with Daniel Slilaty.

ALAMGIR HOSSAIN, Simon Fraser University
Ice Sheet Modelling using the Level Set Method

Predictions of future sea-level require ice sheet models that are able to robustly simulate the evolution of ice sheets and glaciers. For short-term ice dynamics prediction, an optimal fit between observations and model output is essential. Ice is an incompressible and non-Newtonian viscous fluid with extremely low Reynolds number flow. In this talk, I will present a numerical algorithm that uses the level set method to evolve the ice sheet surface position and also captures topological changes for glaciers and the evolution of the ice-air or ice-water interface. This algorithm is evaluated by comparing different benchmark simulations using the shallow ice approximation and the shallow shelf approximation. I demonstrate that the level set method is a reliable approach for tracking the ice surface interface and terminus positions for advancing and retreating ice sheets.

This is a joint work with my doctoral supervisors Dr. Sam Pimentel (Trinity Western University) and Dr. John Stockie (Simon Fraser University).

JIO JEONG, Independent Scholar
In Re, Ante Rem, and Naturalist Varieties of Structuralism

Eliminative structuralism is the view that mathematical structures and places in structures do not exist, and that mathematical statements are non-specific generalizations over all systems of a certain kind. Another type of structuralism, sometimes termed ante rem as opposed to the eliminativist in re, sees structures and their elements as property-deficient entities that exist in their own right, independently of exemplifying systems. This paper will propose a third, naturalized account of structuralist philosophy of mathematics. Naturalism rejects philosophical arguments that judge mathematical practices by non-mathematical considerations. On this view, philosophical discussion should ultimately impact standard mathematical practice. The history of mathematical progress shows that the expansion of mathematics was quite possible without the development of structuralist philosophical accounts, but the opposite cannot be true since advances in mathematics, especially algebra and model theory, were precisely what enabled the formulation of structuralism in the first place. The lessons apparent from the origins of structuralism indicate that mathematical practice is epistemologically prior to its philosophy, and therefore that philosophers should, as a point of methodology, conform closely to implications for mathematical practice. The observation, due to Burgess, that the philosophical distinction between in re and ante rem varieties of structuralism only manifests itself in metaphysical discourse, and never in actual mathematical practice, thus gives grounds for a naturalist dismissal of this supposed distinction in structuralist ontology.

ANTHONY SHAHEEN, CSU Los Angeles
Isoperimetric constants of generalized Paley graphs

In this talk we will define the isoperimetric constant of a regular graph. We will also talk about generalized Paley graphs and their properties. We will then give estimates on the isoperimetric constant of a generalized Paley graph. This is work that I did with two undergraduates at CSULA.