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Seminar

MODELLING OF WIND DATA ON THE DISC MANIFOLD

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Abstract

The joint modelling of angular and linear observations is crucial as data of this nature are prevalent in multiple disciplines, for example the joint modelling of wind direction and another climatological variable such as wind speed or air temperature, the direction an animal moves and the distance moved, or wave direction and wave height. Hence, there is a need for developing flexible distributions on the hyper-disc, which has support of the interior of the hyper-sphere, as it allows for modelling the combination of angular and linear observations. A new class of bivariate distributions is proposed which has support on the unit disc in two dimensions that includes, as a special case, the existing Möbius distribution on the disc. This new class of distributions for the disc have the ability to capture any inherent bimodality present in the data. The flexible behaviour of the proposed models in terms of bimodality and skewness is graphically demonstrated. The fit of the proposed models, which account for bimodality, to the Marion Island wind data were evaluated analytically and visually. The competence of the proposed models were also assessed by considering the Noupoot weather station in South Africa.