DECENTERED DIRECTIONAL DATA

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Abstract. Directional data analysis usually assumes that the observations are recorded according to a coordinate system whose origin coincides with the center of their support. However, it may happen that the observer does not sit at this center and record the directions from another point. The object of this paper is to investigate the statistical behavior of such decentered directions. First we derive the family of distributions of these directions and produce statistical procedures that recover some information about the underlying process. An important special case is explored in details and compared with the Langevin model. Finally, an example is given where the introduced family of models makes physical sense and well fits the observations.

Key words and phrases: Directional data, goodness-of-fit, group family, Langevin distribution, location shift, maximum likelihood theory, rotational symmetry, uniform distribution, von Mises Fisher distribution.