1.3 AN INVERSE PROBLEM APPROACH TO RETRIEVE FIELDS OF DROP SIZE DISTRIBUTION PARAMETERS FROM XBAND POLARIMETRIC RADAR VARIABLES

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Polarimetric radars use indirect information on raindrops′ oblateness at falling to provide more information about the drop size distribution than conventional radars. Many studies have used empirical relationships between polarimetric radar variables and physical parameters of rainfall (and snow) to retrieve rain rate and DSD fields from radars. Another common approach is to use relationship based on modeling polarimetric variables through the T-matrix scattering calculations for oblate scatters [Mitchenko 1996] and DSD information. At attenuating frequency like in the X-band, a two-step approach is usually taken with first attenuation correction and second DSD retrieval. Here an inverse method approach is applied to derive DSD parameters at each radar gate over a radial before any attenuation correction.

We will discuss this radial based inversion method deriving fields of DSD parameters from fields of uncorrected polarimetric radar variables. Comparing retrieved DSD parameters to in situ disdrometer measurements performs the method validation. The method shows convincing agreement with observed DSD. Its main asset is to use all the independent information available per gate (Z_{dr}, Z_h, K_{dp}) and their respective uncertainty to find a compromise solution between observed variables and an "a priori" solution. Another important asset of the method is that no previous attenuation correction is made: the correction of attenuation is handled by the inversion procedure.