Strain distribution in refold structures

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Superposition of folding can lead to very complex 3D layer geometries (i.e. refold structures), which when observed in 2D (e.g. outcrop) are called interference patterns. Commonly used names for the different patterns are 'crescent', 'mushroom', 'hook', 'bird's head', 'dog's tooth' and 'S-Z-W-M' shapes. Refold structures are typically divided, based on their 2D interference pattern, into four types (Type 0-3; Ramsay 1962). Based on the 3D refold structure, this nomenclature, which is widely used by structural geologists, has been extended to six types (Grasemann et al. 2004). In the extended classification Type 03 is identical to Type 0; Type 01 and Type 02 do not generate an interference pattern (hence they were excluded in the original classification), but do fold a lineation contained within the first fold. Perhaps most importantly various transitional forms can be better classified using the extended scheme and, although the end members Type 01 and 02 do not generate interference patterns, transitional forms (Type 01 to 02) do. The purpose of this study is to analyse strain distributions of computer generated refold structures, assuming that the XY-plane and the long axis of the finite strain ellipsoid are parallel to the foliation and lineation, respectively. These synthetically generated strain distributions, plotted on a stereonet, can serve as an aid for structural geologists in deciphering the type of refold structure in situations where either passive markers are absent or the refold structure does not exhibit an interference pattern (as in Type 01 and Type 02).