Confidence intervals for a variance component: Focused on generalized inference approach

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Construction of confidence intervals for a variance component corresponding to the random factor in mixed linear models with two variance components is considered. At first, attention is drawn to an approximate confidence interval suggested by El-Bassiouni (1994), which is an extension of the well known Williams-Tukey interval. Though the stated interval has some nice properties, it is not very often mentioned in the literature. Throughout the talk it serves as a solid representative of approximate solutions. Next, we focus on generalized confidence intervals constructed by fiducial generalized pivots, since it is generalized inference approach, that has been recently applied to the problem at hand. (The notation used follows Hannig et al. (2006).) We present some concrete fiducial generalized pivots derived in our setting and explore the probability of coverage of intervals they yield, having in mind that from the frequentist point of view, a weak spot of generalized confidence intervals is the lack of theoretical guarantee of their confidence level. Our findings make the considered generalized confidence intervals for the variance component better counterparts to the approximate solutions. Final remarks concern comparison of the generalized intervals with the formerly stated approximate method.