On stein's identity, Poincaré-Chernoff inequality and orthogonal polynomials

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Abstract: In this talk, we present a general method for deriving Stein's identity and Poincaré-Chernoff inequality based on orthogonal polynomials. In order to illustrate our method, some applications are given with respect to normal, Gamma, Beta, Poisson, binomial and negative binomial distribution, not only for random variables but also for random vectors, resulting corresponding Stein's identity and Poincaré-Chernoff inequality are obtained consequently. In addition, forward difference formulae of Charlier polynomials, Krawtchouk polynomials and Meixner polynomials, Stein's identity and Poincaré-Chernoff inequality with respect to Beta distribution, as well as Rodrigues formula of Meixner polynomials are also obtained. Interestingly, by examining their Rodrigues formula, we found that Stein's identity and corresponding Poincaré-Chernoff inequality are related closely for normal, Gamma, Beta, Poisson, binomial and negative binomial distribution.

[joint work with Zhengyuan Wei and N. Balakrishnan]

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