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Assessment of the performance of Core Strangle Test (CST) in determination of strength anisotropy in travertines (Sicak Cermik, Sivas, Turkey)

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Anisotropy is one of the most distinct features that must be considered in rock engineering whether it is applied in civil, mining, geo-environmental, or petroleum engineering. Many rocks have anisotropic characteristics, i.e. their mechanical, thermal, seismic, and hydraulic properties vary with direction, and engineering applications that do not consider the anisotropic behaviour of rock produce errors of differing magnitudes, depending on the extent of rock anisotropy. Therefore, anisotropy has been a long-standing issue in rock engineering, beginning in the early developmental stages of rock mechanics. Anisotropic characteristics generally originate from the mineral foliation in metamorphic rocks, stratification in sedimentary rocks, and discontinuities in the rock mass. In this article, usefulness of Core Strangle Test (CST) in determination of strength anisotropy and its performance comparing with other indirect methods was evaluated. As a result of this study, higher performance was obtained, and CST led to considerably lower errors in determination of the strength anisotropy when compared with the results obtained from point load index and Brazilian tests. Moreover, it was found that CST can also be used as an alternative testing method for determination of strength anisotropy of rock core samples that a sufficient dimension can not be obtained and/or simple, fast and economical solutions may be needed. As one of the most important result of this study, the indirect methods where the tensile stresses considerably contribute to total stresses are unadvisable in determination of the strength anisotropy in which the anisotropy planes start to be parallel to the loading axis after approximately phi equal to 45 degrees.