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Refraction effect on Iranian Levelling Network; Comparing Different Methods

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Refraction is one of the important and very complicated systematic errors in Levelling especially in rough areas and the areas with complicated climate. Iran located in a region with varied topography and climate. Therefore, refraction effect on Iranian leveling network can be remarkably high and must be considered. This effect stems from the difference between the refraction angle for backsight and foresight observations due to the different temperature of the atmospheric layers. In this study, the effect of the refraction in the leveling lines of the Iranian Levelling Networks is evaluated. Collected temperatures from the sensors mounted in certain hights of the leveling staffs are used in this assessment. Results show that modelling and correcting the network for refraction yields in improvement of the Levelling network. For sake of refraction modeling, numerous methods are implemented and the results are compared. The implemented methods are: Kukkamaki, Brocks, Pelzer, Mozzuchin and Garfinkel. Results from spectral analysis and accumulated error diagrams show that the Kukkamaki method has been the most confident method for reducing the refraction effect from the data set. Among the other methods, Mozzuchin formula is also recommended because it has been able to remarkably reduce the refraction.