



On the modeling of eigen-multipath behavior of permanent GPS stations

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It is a common practice that the mask angle of the permanent GPS stations is set to zero to take advantage of maximum satellite coverage. However, in this way the observations of the permanent GPS stations would be contaminated with the multipath error, and consequently, the users of the permanent GPS stations are forced to apply suitable mask angles during the data processing stage. This resolution, although provides the possibility of avoiding multipath, but reduces the number of observation epochs used for the computations. In this paper, considering the fact that the multipath is resulted from surrounding objects of the antenna of the permanent GPS stations, characteristic behavior of the GPS satellites under multipath is derived as a function of time. More precisely, using such a behavior, a function of time is developed to indicate the periods of the day when a certain satellite: (i) is affected by multipath, (ii) is suspicious to multipath, or (iii) is multipath free. Such function, which can be regarded as an “eigen-multipath” function of a specific satellite, could be used as a multipath indicator during the processing of the GPS data, either to remove the contaminated epochs with multipath or to predict a proper weight for the observations during the suspicious to multipath periods. This method as a case study is applied to the observations of the permanent GPS station of the Department of Surveying and Geomatics Engineering of the University of Tehran. Details of the computations are presented in the paper.