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The geometric aspect of ship position coordinates determination accuracy

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The modern process of navigation is described in four-dimensional space - three geometric dimensions and time. For this reason both the description and analysis of navigational systems should be performed in the same space. The traditional geometric factor of the land-based radionavigational systems was generalised to include the factor GDOP, PDOP,HDOP,VDOP and TDOP for the needs of the accuracy analysis of a GPS systems. These terms are related to the so-called geometry of navigational system - through mutually related positions of gradients of navigational functions determining position lines (hyperplanes).They are connected with non-linear regression through a probabilistic relation between the measured navigational parameters. Consequently, the concept of geometric factors in the process of navigational parameters estimation can be also extended to include a large number of dimensions appropriate for the state vector. The paper presents generalized concepts of geometrical factors of a navigational system. Such factors are used in the analysis of the accuracy of various radionavigational systems aimed at selecting the best system for a given area.