**"Gyroskopiya i Navigatsiya" №1, 2005**

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| Traditionally, the accuracy of the velocity algorithms in a vibrational environment is enhanced by incorporating a so-called "sculling" correction, which reduces system drift errors. Conventional approach that leads to the sculling algorithms optimization procedure assumes an ideal (or flat) IMU-sensors frequency response. However, in many instances, accelerometers and gyros exhibit complex frequency responses, which may lead to degradation of system performances in a sculling environment. This paper develops the mathematical basis for the calculation of the sculling algorithm coefficients for the case of frequency shaped IMU data. The velocity error model is expressed in terms of in-phase and quadrature frequency dependent normalized error functions that define the manner in which resultant rectification error depends on frequency responses of the system software and hardware implementation. Discussed here is a method of deriving sculling algorithms which are tailored to the dynamical characteristics of the particular type of accelerometers and gyros used. It is shown that the duality property of optimal coning and sculling algorithms can be extended for the case where the gyros and accelerometers exhibit the same frequency responses. A new formulation of the error minimization criterion is implemented in the algorithms design technique,which provides the error free system response at some fixed frequency of a vibrational input. Some characteristic problems involved in the sensor tailored algorithms design are considered. Also presented in the paper are the examples that demonstrate some typical application of the developed design procedure. |  |

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**Brief  note**

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