General Relativity and Quantum Cosmology

Time Delay Interferometry for LISA with one arm dysfunctional

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In order to attain the requisite sensitivity for LISA - a joint space mission of the ESA and NASA- the laser frequency noise must be suppressed below the secondary noises such as the optical path noise, acceleration noise etc. By combining six appropriately time-delayed data streams containing fractional Doppler shifts - a technique called time delay interferometry (TDI) - the laser frequency noise may be adequately suppressed. We consider the general model of LISA where the armlengths vary with time, so that second generation TDI are relevant. However, we must envisage the possibility, that not all the optical links of LISA will be operating at all times, and therefore, we here consider the case of LISA operating with two arms only. As shown earlier in the literature, obtaining even approximate solutions of TDI to the general problem is very difficult. Since here only four optical links are relevant, the algebraic problem simplifies considerably. We are then able to exhibit a large number of solutions (from mathematical point of view an infinite number) and further present an algorithm to generate these solutions.

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