A ground simulator development for satellite-to-satellite laser interferometer

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Satellite gravity mission, such as CHAMP and GRACE, is attractive for Japan because it can monitor the time varying gravity which is affected by the geophysical activities. We started a feasibility study of future gravity field mapping from the space. It is a three years plan. We focused the laser interferometric technique for the future mission because its performance is expected to be superior to radio interferometer. We are studying the technique developing the Ground Simulator. The design of the Ground Simulator system is Mach-Zender optical interferometer type. It is composed of stabilized laser, gravity field simulator and its retrieval system. Since the length of the arm in space will be over 50km, coherence of the signal should be kept till the fringe is observed. In other words, we need a frequency stabilized laser. Semiconductor laser (780nm) locked to Rb absorption line is developed first. Expected stability is 10**-13. The wavelength is not yet decided for the future space mission.We will test 1.0 and 1.5 micron laser, too. To simulate the geoid in space, AOM (acousto-optical modulation) will be used for doppler effect. The simulated signal will be retrieved in the final stage. Furthermore, controller of the pointing error will be developed. We are cooperating with the related research groups in Japan. Particularly, we exchanged technical information with gravity wave detection system (TAMA300) group and Inter-satellite optical communication group. Our study is supported by the fund of Ministry of Education, Culture, Sports, Science and Technology.