Abstract Submitted
for the SES05 Meeting of
The American Physical Society

Numerical simulation of LIGO input optics SHIVANAND NONE[1], Indian Institute of Technology, NAFIS JAMAL, Stanford University, SANICHIRO YOSHIDA[2], Southeastern Louisiana University — Numerical analysis has been carried out to understand the performance of the Input Optics used in the first generation of LIGO (Laser Interferometer Gravitational-wave Observatory) detector. The input optics is a subsystem consisting of a mode cleaner and mode-matching telescope, where all the optics are suspended and installed in vacuum. Using the end-to-end package (LIGO programming language), computer codes have been made to simulate the input optics. Giving realistic seismic noise to the suspension point of the optics and using the length sensing/alignment sensing control for the mode cleaner, the performance of the input optics has been simulated under various scenarios such as with an order of magnitude higher seismic noise than the normal level, and with/without the alignment sensing control feedback from the arm cavity to the mode-matching telescope. The results are assessed in terms of the beam pointing fluctuation of the laser beam going into the arm cavities, and its influence on the optical coupling to the arm cavities and the noise level at the gravitational wave port signal.

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Date submitted: 08 Aug 2005 Electronic form version 1.4