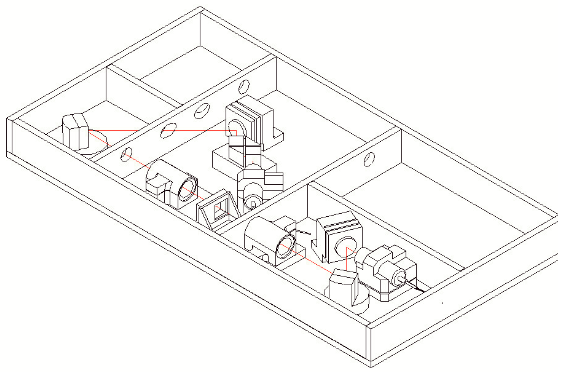
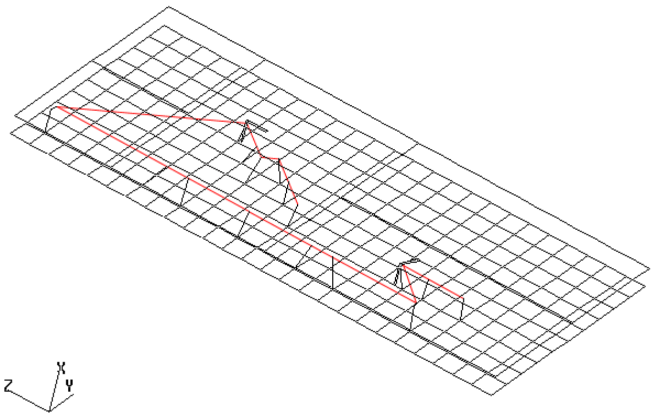
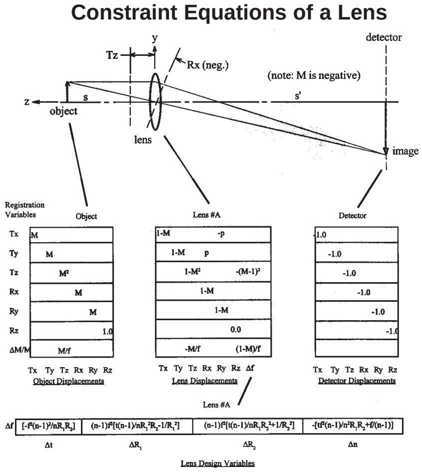
Fiber Optic Spread-spectrum Encoder



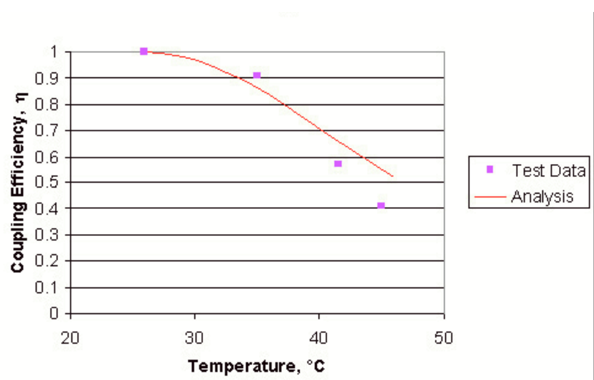


Constraint Equations of a Lens



The optomechanical constraint equations were used to simulate the behavior of a fiber optic spread-spectrum encoder. The encoder had exhibited high losses in elevated temperature testing and the constraint equations identified the contributors to the loss of coupling efficiency at elevated (and reduced) temperatures.

The mechanical design was simulated in a simple finite element thermal and elastic model. The optomechanical constraint equations were used to couple 96 elastic displacements of the finite element model and 12 property changes (due to temperature) of the optical elements to the position of the focused output beam with respect to the output fiber. From these registration errors the coupling efficiency could be calculated. The results agreed well with engineering test (see chart) and the major contributors to coupling loss were identified.



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