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# Thermal effects in optomechanical systems for space applications

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## Abstract

Optomechanical systems often have to operate over a wide temperature range. The effects of temperature changes on the performances of some typical optomechanical systems are described in this paper. Analytical method and finite element models (FEM) software for thermal stresses caused by continuous edge, six point and face elastomeric bonds. Analytical equations for the thermalized edge bond thickness, thermal stress and the thermal OPD (optical path difference) are calculated where possible and verified by finite element solutions. The thermal OPD will vary with the temperature to cause wave front distortion, which may present serious problems in high resolution optical systems. The comparison shows that simple analytical solutions provide low estimates error for thermal stresses and can be very helpful for decision makers and optical engineers during the development phases of space optomechanical systems.

**Keywords:** bonded optic, elastomer, thermal stress, thermo-optic coefficient, OPD