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Optical Fiber Bragg Grating Response Function and its Temperature Dependence for a Polymer Coating of Temperature Dependent Thermal Expansion Coefficient DEVENDRA PARMAR, ALPHONSO SMITH, Department of Electrical Engineering, Hampton University, Hampton, VA 23669, ROBERT ROGOWSKI, NASA Langley Research Center, Hampton, VA 23681 — In-fiber Bragg gratings are highly sensitive to thermal and strain fields and have been widely used as temperature and strain sensors. Effects of the strain-optic and thermo-optic elements of optical fiber Bragg grating (OFBG) response function are often mixed, inter-competing and complicated to isolate. Moreover, both these elements are influenced by the thermal expansion coefficients, α, of the fiber core, cladding and the protective coating composite. Polymer protective coatings with large α have been reported to improve temperature sensitivity ($\sim$ 0.1 nm/$^\circ$C) of the response function. However, the results are complicated and less reliable due to non-linearity of α(T) when using wider temperature range (such as 20 K – 400 K). This paper reports determination of the OFBG response function for a polymer coating of a large but linear α(T). The results have been compared with responses from OFBGs coated with materials of non-linear α(T).

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