Electro-Optics Technology, Inc.

Advantages of the PAVOS Product Line

Joseph Mambourg, Electro-Optics Technology, Inc., 3340 Parkland Ct. Traverse City, MI 49686, USA

Terbium gallium garnet (TGG) based Faraday isolators and rotators have been an industry standard for the last decade. With modern growth methods and precisely controlled raw materials, TGG is a robust Faraday crystal that has found application across the industry. For all of its advantages over other available Faraday crystals, it does provide some design challenges. Primarily, these challenges are due to the bulk absorption of the material causing thermal lensing and thermal birefringence. In order to minimize these effects, Electro-Optics Technology (EOT) has focused on minimizing the TGG rod length within our products while also sourcing only the highest quality material. These principles drove the development of the market-leading PAVOS product line and the recently released PAVOS+. In addition, it is clear that a new Faraday material is needed to support the latest generation of high power laser systems. For these applications, EOT has developed the PAVOS Ultra product line which is based on Potassium Terbium Fluoride (KTF) Faraday crystals.

The PAVOS+ achieves many performance improvements over the standard PAVOS through innovative magnetic design. As an example, EOT commonly measures thermal lens focal shift of our products as a function of the Rayleigh range, Z_R, for a given beam diameter versus input power, e.g., ΔZ_R /kW. This parameter is independent of actual beam diameter, theoretically scales linearly with power, and is useful to our customers during design. Figure 1 presents the results of these measurements on the PAVOS and PAVOS+ products and demonstrates a 30% improvement in the PAVOS+. These improvements extend the capability of the PAVOS line while providing reductions in overall product size.

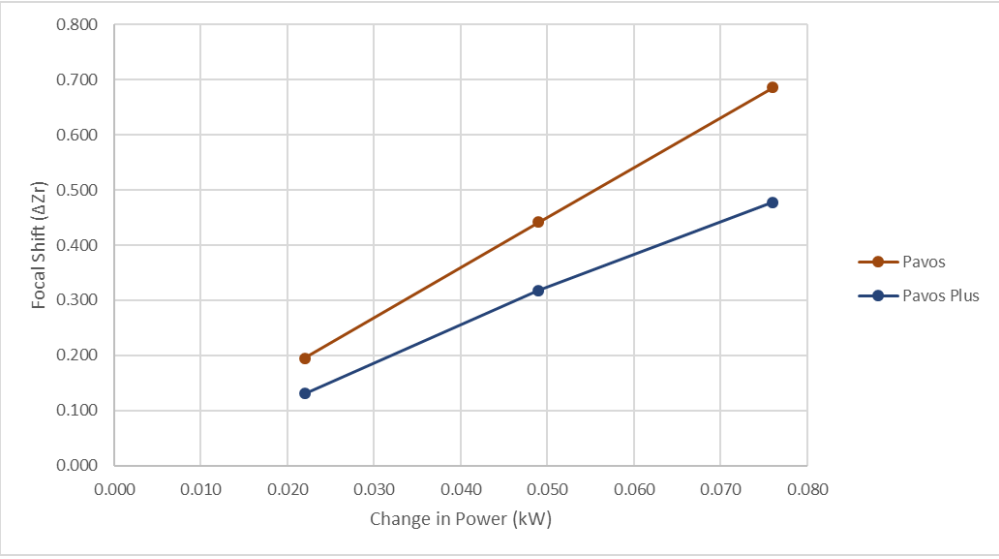

Figure 1: Thermal Lens Focal Shift Comparison

For the most demanding of applications, EOT has developed the PAVOS Ultra. These Potassium Terbium Fluoride (KTF) based isolators provide a generational improvement in performance. As shown in Figure 2, the thermal lens focal shift of the PAVOS Ultra is significantly reduced and slightly negative.

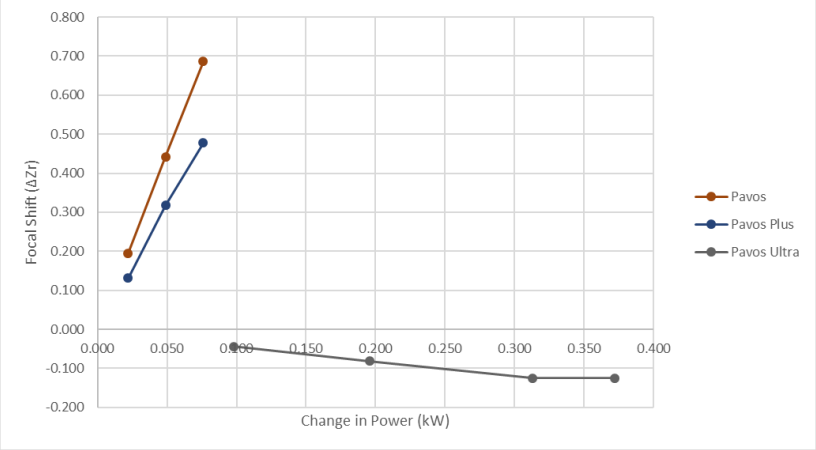

Figure 2: Effect of Laser Power on Focal Shift

In most practical laser systems, this slight negative thermal lens focal shift can be used to offset small, positive thermal lens focal shifts that arise from common components, such as fused silica lenses. Furthermore, as shown in Figure 3, the PAVOS Ultra maintains high extinction at high power due to its reduced bulk absorption.

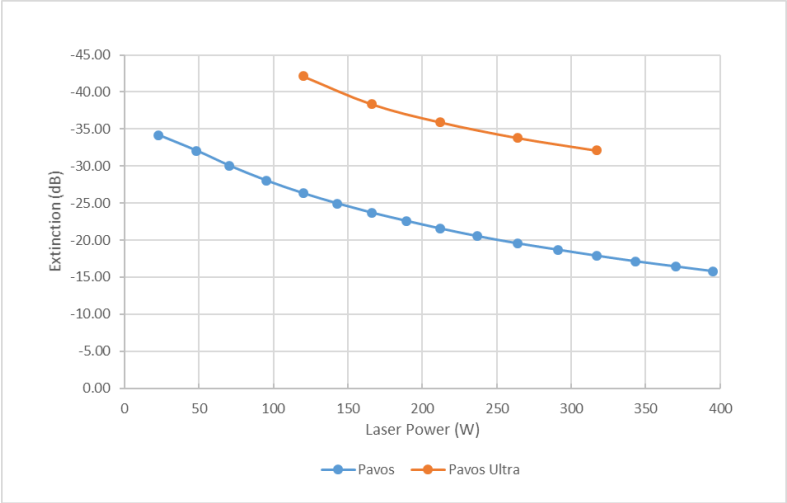

Figure 3: Effect of Laser Power on PAVOS and PAVOS Ultra Extinction

A final important benefit of the PAVOS Ultra products is the theoretically 10x lower non-linear refractive index. This is highly beneficial for managing B-integral phase shifts to prevent catastrophic whole beam self-focusing in high peak intensity laser systems. These and other improvements cement the PAVOS Ultra as the market leader.

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EOT-based Faraday isolators and rotators will continue to be the industry standard due to our commitment to produce innovative and industry leading products that enable our customers.