DESIGN AND CONSTRUCTION OF A LASER BEAM PROFILER FOR USE WITH CONTINUOUS WAVE LASERS IN THE MID-INFRARED

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In most spectroscopic techniques involving the use of a laser, it is desirable to have knowledge of the beam's intensity profile and size as it propagates through an optical system. This is especially true for continuous-wave cavity ringdown spectroscopy, in which the laser must couple into the TEM_{00} mode of a high-finesse cavity for optimal results. While many commercially-available products exist for the characterization of lasers in the visible and near-infrared, such is not true for most cw-lasers (i.e. with powers less than $\sim$100 mW) in the mid-infrared, a spectral region that contains detailed information concerning rovibrational structure and is an active area of spectroscopic interest. To address this deficiency, we constructed a rotating-drum laser beam profiler in our laboratory for use with mid-infrared lasers. Detection is performed with a room-temperature photovoltaic device that covers the 2-11 μm range; however, the design allows for the use of nearly any detector system in order that the same profiler may also be used for visible and near-infrared beams. We will discuss the design and construction of this device. Accompanying automated acquisition software for the device written in LabWindows will also be discussed, along with the usage of the profiler-software combination to assess beam quality and to assist in the design of an optical system.