Typically a comparison would be made between the thermal-loading limits imposed by the bulk absorption of candidate crystals. Experimental data can be compared with the predictions of thermo-optic models. These routines determine the thermal loading, beam propagation, and resulting three-wave mixing performance for an arbitrary set of boundary conditions. Steady-state and time-dependent solutions can be found. The thermo-optic information provides phase-error data for three different phase-matching programs used for performing three-wave mixing calculations.

If there is reasonable agreement between the experimental data and the modeling results, then the inherent risks of scaling to HAP operation can be reduced by using the models to determine an optimized crystal-and- beam geometry. The goal is to define a range of laser/crystal parameters, explore their effect on beam propagation and output power, and compare these results with the range of requirements desired by the user. Possible compensation schemes can be explored to control the effects of HAP operation on OPO resonator or SHG performance. These might include unconventional rod shaping, external thermal constraints, and phase-front compensation.

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