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Theoretical Analysis and Numerical Evaluation of the Flow inside the Supersonic Nozzle for Chemical Lasers

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Abstract : The main objectives of work in this area are, first, obtaining the high laser energies in short time durations needed for the feasibility studies of laser induced thermodynamically exothermic chemical reactions , second, investigating the physical principles that can be used to make laser sources capable of delivering high average powers. We note that, in order to reach both objectives, one has to convert electrical or chemical energy into laser energy, using dense gaseous media.. We present results from the early development of an F atom source appropriate for HF and DF chemical laser research. We next explain the very important difficulties encountered in working with dense gases for that purpose, and we shall describe how, especially at Evaluation of downstream-mixing scheme –levels transitions (001) → (100) and (001) → (020) gas dynamic laser The physical phenomena that control the operation of presently existing laser devices are now sufficiently well understood, so that it is possible to predict that new generations of lasers could be designed in the future. The proposed model of excitation and relaxation levels was finally proved by the computational numerical code of Matlab toolboxes of different parameters of nozzle.

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