Single- and Multi-photon Absorption of Carbon Dioxide Laser Lines by SO_2 and CO_2 Molecules (*).

F. AL-ADEL and S. M. A. DURRANI

Laser Research Section, The Research Institute
King Fahd University of Petroleum and Minerals
Box 732, Dhahran 31261, Saudi Arabia

(ricevuto il 18 Gennaio 1995; revisionato l'11 Luglio 1995; approvato il 2 Agosto 1995)

Summary. — We have used 60 rovibrational lines of a Lumonics TEA CO_2 laser to record the spectra of coincidence of SO_2 IR absorption with CO_2 laser emission. We extended the same type of investigation to CO_2 molecules and observed an absorption at practically all the rovibrational lines of the laser. We have also recorded the increase of absorption with pressure of the studied molecule and with its temperature. Our work reveals very accurately the fine structure of these absorptions that shows a clear discreteness in the intensities of the lines. Some implication of this discreteness in multiphoton absorption is also presented, through data that indicate very strong vibrational coupling between ground and excited electronic states of SO_2.

PACS 33.20.Ea – Infrared spectra.