We present a theoretical study of mixed-field-orientation experiments of polar linear molecules. In these experiments, pendular states were created by means of linearly polarized strong laser pulses combined with tilted weak electric fields. Within the rigid rotor approximation, we assume that the dc field couples with the dipole moment and the ac field by means of the polarizability anisotropy, and solve the time-dependent Schrödinger equation taking into account the time profile of the alignment pulse. Our results show that the adiabaticity of the mixed-field orientation depends on the avoided crossings that the states suffer, as well as, on the formation on the quasidegenerate doublets that characterize the pendular regime. Hence, we probe that, in general, the weak dc field orientation is not adiabatic and that a time-dependent description of this process is mandatory. Specifically, we compare our numerical results with the measurements corresponding to the OCS molecule for different field configurations obtaining a good agreement [1]. This work complements our previous study for asymmetric top molecules exposed to tilted fields [2], where we have shown that an adiabatic description is not enough to explain the experimental results even for long laser pulses.

References
