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Highlighting of the discharge instabilities in high-pressure plasmas for excimer lasers ZAHIR HARRACHE, Departamento de Fisica, Universidad de Cordoba, 14071 Cordoba (Spain), DRISS AMIR-AID, AHMED BELASRI, Lab. Phys. Plasmas, Mat. C./A., Univ. Sci./Technol., 31000 Oran (Algeria), MARIA DOLORES CALZADA, Departamento de Fisica, Universidad de Cordoba, 14071 Cordoba (Spain) — The XeCl laser has a number of important applications related to its high power and the fact that it produces UV radiation (λ=308 nm). Despite this remarkable properties, XeCl laser suffers from some limitations; when sustained by high-pressure discharges, it is subject to instabilities. Instabilities are more likely to occur at high pressure because (i)- streamers can appear near each electrode and lead to arcing during the formation of the plasma [1], (ii) once the plasma is formed, chemical kinetic instabilities can lead to plasma filamentation due to volume instability known as halogen depletion instability [2]. The experimental investigation of XeCl laser has proved that the instabilities occur before the end of laser emission. In this work, we discuss the streamer and the halogen depletion instabilities in high-pressure discharges. The obtained results show clearly that the plasma uniformity and the power deposition in the medium are strongly sensitive to volume instabilities.

[1] A. Belasri et al., Phys. Plasmas 10, 4874 (2003).
[2] Z. Harrache et al., Europhys. Lett. 66, No. 1, 76 (2004).

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