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Modeling and experimental study of dielectric barrier discharges for mercury free flat lamps BEAUDETTE TRISTAN, GUILLOT PHILIPPE, BELENGUER PHILIPPE, CALEGARI THIERRY, THERESE LAURENT, CPAT, AUDAY GUILLAUME, Saint Gobain Recherche, CPAT COLLABORATION, SAINT GOBAIN RECHERCHE COLLABORATION — In this paper, a simple dielectric barrier discharge flat lamp developed by Saint-Gobain Glass is characterized. The lamp is consisting of two glass plates separated by a constant gas gap. The glass thickness is 4 mm and the gap 2 mm. The surface is 30cm x 30cm. A transparent conducting material (electrode) has been deposited on both external sides and phosphors (white emitting powders) on both internal sides of the dielectric. The lamp can be filled with rare gas mixture and can operate in a pressure range of 100-400 torr. A sinusoidal excitation voltage can be used up to 3000V in a frequency range of 10-50 kHz. In this work, we will present some results concerning a Ne-Xe 50% mixture at a pressure of 188 torr and we will discuss the influence of the applied voltage (amplitude and frequency) on the consuming power, the light emission and mostly on the non-homogeneity of the discharge. Using a 2 dimensional model developed in our laboratory, the effects of the applied voltage (amplitude and frequency) and the pressure will be studied. Particularly on the distance between the streamers when the discharge is not homogeneous. Finally experimental and theoretical results will be compared.

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