

S P A R K D I S C H A R G E S
I N
L O W P R E S S U R E
S U L P H U R H E X A F L U O R I D E

by

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SUMMARY

The present thesis describes the various phases of development in low pressure (~ 1 Torr) sulphur hexafluoride (SF_6) sparks formed in long gaps (4 - 100 cm) and at overvoltages greater than 100%.

In Ch. 1, a literature review relevant to the study of the SF_6 spark is presented. In Section 1.1 a review of spark development in non-attaching gases, as studied by several workers, is presented. In Section 1.2, the development of sparks in electron-attaching gases is presented, together with an account of previous spark studies in SF_6 . In Section 1.3 a discussion of the fundamental collision processes in SF_6 and their dependence on mean electron energy is presented, while in Section 1.4 an account is given of the high-voltage insulation and switchgear applications of the gas.

In Ch. 2, a detailed description is given of the experimental systems employed together with an account of the time-resolving diagnostic apparatus and techniques used. Oscillographic and interferometric methods have been primarily used to obtain information on spark development.

Chapter 3 deals with the experimental results relating to certain aspects of the prebreakdown, breakdown and postbreakdown regimes in the low pressure SF_6 spark, with most of the emphasis placed on postbreakdown development. The various phases and transitions in the growth of the spark are catalogued and discussed in the light of experimental observations. The results indicate the existence of two distinct abnormal glow phases. The mechanism of the transition from the first to the second glow phase is accounted for in terms of molecular dissociation. The transition to the arc phase is observed to be encouraged by the presence of insulating surfaces surrounding the cathode. This transition, which has been accounted for in terms of a field-emission mechanism, can occur from either of the two glow phases.

Following a description of the various phases and observed phenomena, a summary and general conclusion are presented.

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SYNOPSIS

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