PPPS 2019



Contribution ID: 530

Type: Oral

Generation of Intense Pulsed X-ray and Repetitive Pulsed X-rays

Thursday 27 June 2019 11:45 (15 minutes)

Both intense pulsed X-ray and repetitive pulsed X-rays play an important role in the investigation of various physical processes in hydrodynamic experiments.

In order to generate intense pulses X-ray, 1.2 MV pulsed power generator and rod-pinch diode are designed and constructed at Institute of Fluid Physics, CAEP. The generator is composed of a Marx generator, an upstream oil line, a pulse forming line, an oil switch, a transfer line and a load. An optical system is built to center the rod as precisely as possible in the center of the cathode aperture. The X-ray dose of 1.4 R at 1 m in the forward direction and the spot size of 1.47 mm are achieved. The rod-pinch diode model validated by experiments can be used to predict the characteristics of rod-pinch diode at higher voltage.

In order to generate repetitive pulsed X-rays, a stacked Blumlein line (SBL) type pulsed power source (200 kV, 1 kA, 1 kHz) based on photoconductive semiconductor switches (PCSSs) and industrial cold cathode diode have been constructed. More uniform electron emission has been achieved by employing spoke-shaped metal-ceramic surface flashover cathode. Repetitive pulsed X-rays with FWHM of 40 ns and repetition rate of 1 kHz were generated.

To achieve higher burst rate of pulse X-rays, a branch of pulse X-ray machine (210 kV, 5 kA), which is composed of a PFL-Marx and diode, has been construced. Pulse X-ray with FWHM of 40 ns and spot size of less than 1.6 mm were generated.

This work was supported by National Natural Science Foundation of China (51007085, 51207147, 51407170 and 51477185)

Author: Dr YUAN, Jianqiang (Institute of Fluid Physics, China Academy of Engineering Physics)

Co-authors: Prof. XIE, Weiping (Institute of Fluid Physics, China Academy of Engineering Physics); Mr GENG, Lidong (Institute of Fluid Physics, China Academy of Engineering Physics); Dr LIU, Hongwei (Institute of Fluid Physics, China Academy of Engineering Physics); Mr WANG, Lingyun (Institute of Fluid Physics, China Academy of Engineering Physics); Prof. LI, Hongtao (Institute of Fluid Physics, China Academy of Engineering Physics); Dr MA, Xun (Institute of Fluid Physics, China Academy of Engineering Physics); Mr JIANG, Ping (Institute of Fluid Physics, China Academy of Fluid Physics, China Academy of Engineering Physics); Mr JIANG, Ping (Institute of Fluid Physics, China Academy of Fluid Physics); Dr MA, Xun (Institute of Engineering Physics))

Presenter: Dr YUAN, Jianqiang (Institute of Fluid Physics, China Academy of Engineering Physics)

Session Classification: 3.2 Intense Electron and Ion Beams

Track Classification: 3.2 Intense Electron and Ion Beams