DEVELOPMENT AND TESTING OF SPECIAL EQUIPMENT FOR VIDEO RECORDING OF DETONATION WAVES

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Abstract: The article describes the results of testing the developed device for optical registration of detonation processes. Some ways which help improving the quality of the obtained images registered during the experiments as well as methods of reducing both computational resources and time of data processing are investigated and described. Software and hardware methods of image adjustments and area recognition are considered. The article describes methods which are suitable for a specially designed device for recording detonation waves. The developed device was tested and showed its ability to register detonation processes provided acetylene or other carbon-containing gas for highlighting. Important feature of the device is the ability to conduct video recording by one 1092-pixel line using the maximum frame rate.

Keywords: continuous detonation; equipment; electrical engineering; high-speed video recording

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Figure Captions

Figure 1 Block diagram (*a*) and photo (*b*) of data storage subsystem (one board including 3 Gb of random access memory)

Figure 2 Block diagram of the developed firmware

Figure 3 The device installed on a tripod (*a*) and the device without aluminum frame (*b*)

Figure 4 Image fragment generated by line by line placement of the image string $T_{\text{exp}} = 16$ us, to the left $V_{\text{bias}} = V_0$ and $V_{\text{bias}} = 4/3V_0$ to the right

Figure 5 Image fragment for pixel photo response non-uniformity calculation

Figure 6 Detonation initiation process in fuel–air mixture recorded by the developed device (*a*) and high-speed Photron SA5 camera (*b*)

Table Caption

Characteristics of the device based on line and square sensors depending on number of memory modules

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