



High Voltage Seismic Generator

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This contribution describes the preliminary result of annual cooperation of three student research groups from AGH UST in Krakow, Poland. The aim of this cooperation was to develop and construct a high voltage seismic wave generator. Constructed device uses a high-energy electrical discharge to generate seismic wave in ground. This type of device can be applied in several different methods of seismic measurement, but because of its limited power it is mainly dedicated for engineering geophysics. The source operates on a basic physical principles. The energy is stored in capacitor bank, which is charged by two stage low to high voltage converter. Stored energy is then released in very short time through high voltage thyristor in spark gap. The whole appliance is powered from li-ion battery and controlled by ATmega microcontroller. It is possible to construct larger and more powerful device. In this contribution the structure of device with technical specifications is presented. As a part of the investigation the prototype was built and series of experiments conducted. System parameter was measured, on this basis specification of elements for the final device were chosen. First stage of the project was successful. It was possible to efficiently generate seismic waves with constructed device. Then the field test was conducted. Spark gap was placed in shallow borehole (0.5 m) filled with salt water. Geophones were placed on the ground in straight line. The comparison of signal registered with hammer source and sparker source was made. The results of the test measurements are presented and discussed. Analysis of the collected data shows that characteristic of generated seismic signal is very promising, thus confirms possibility of practical application of the new high voltage generator. The biggest advantage of presented device after signal characteristics is its size which is 0.5 x 0.25 x 0.2 m and weight approximately 7 kg. This features with small li-ion battery makes constructed device very mobile. The project is still developing.