Online Fibre Optic Leakage Detection System at Banja Damm, Albania

The early detection and exact localisation of leaks in hydraulic engineering sealings are the basis for reliable and safe structural monitoring. Temperature measurements along fibre optic cables enable the exact localisation of leaks and help to prevent possible damage in good time.

Banja Damm, Albania

Along the Devoll River in Albania, three dams were built for energy production the lowest of these is known as Banja Dam. The 80 m high rock fill dam was completed in 2016 and has a storage volume of 178 Mio m^3. During construction, an automatic fiber optic leakage detection system was installed in order to detect any leaks through the clay core into the downstream filter of the dam.

For the leak detection system, approximately 1790 m of fiber optic hybrid cable was installed, which consists of two components: fibers for temperature sensing and electrical conductors. The electric conductors offer the possibility of heating the cable and thus different options for leakage detection. Temperature, heat-up behavior and thermal conductivity can be determined. In particular, the combination of temperature increase and the thermal conductivity provides a highly effective and sensitive tool of monitoring leaks. Nevertheless, applying the gradient method proves often as invaluable, especially in a dam with a clay core.

The fibre optic cable was installed in a loop in order to differentiate the height level of possible seepage flows. The leakage detection system works with an accuracy of ±0.5 m and ±0.1 K. Before impoundment a reference measurement was carried out in February 2016, which serves as a reference to subsequent measurements.