Development of a multi-level groundwater monitoring system using fiber Brag grating approach

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Measuring the groundwater pressure and temperature at multiple depths of a well improves the observation efficiency and is more economical than the traditional well, which usually measures the lumped groundwater pressure at a specific depth depending on the screen length and depth. The traditional approach to measuring the discrete pressure and temperature needs seal, which takes a high risk of failure interrupting the vertical hydraulic connection. Some commercial multi-level groundwater monitoring systems have developed recently, and they work well in the field. However, some of them still need the sealing process, and most of them are electric system, which needs high-quality water-proof casing for long-term observation under high water pressure condition and may not validate for the site with flammable gas and liquids. To overcome these issues, this study develops a multi-level monitoring system to measure discrete groundwater pressure and temperature in a single well based on fiber Brag grating system. The developed system has been examined in the laboratory and a field site. The accuracy and capability of the proposed system are demonstrated in this study.

Keywords: discrete groundwater monitoring, fiber Brag grating , groundwater pressure and temperature, multi-level groundwater monitoring system

