



Figure 1.: Mactaquac Dam, located in Keswick Ridge, NB.

Figure 2: Comparison of the X data from the SAA and Inverted Pendulum.

Figure 3: Comparison of the Y data from the SAA and Inverted Pendulum.

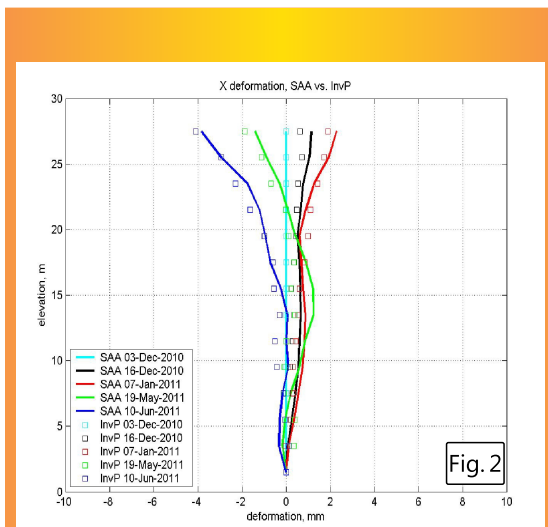


Fig. 2

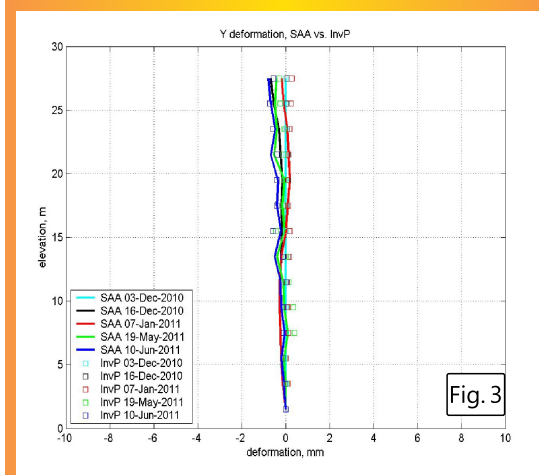


Fig. 3

The expansion of concrete caused by alkali-aggregate reaction (AAR) causes significant deformation at the Mactaquac Generating Station, located in Keswick Ridge, New Brunswick, Canada. Several technologies are used to monitor the deformation behaviour of the dam, among which are included inverted pendulums (InvP). The inverted pendulums provide critical information regarding the overall tilt of the dam intake, powerhouse, and spillway gate structures. The expenses associated with installing pendulum technology and the relatively short life expectancy of the same led engineers to investigate the feasibility of using ShapeAccelArray (SAA) as a supplementary technology. The micromachined electromechanical system (MEMS) accelerometers used to measure tilt within SAAs are theoretically capable precision approaching that of inverted pendulums. SAA also offers the ability to monitor along a non-straight path.

The initial data show good agreement between the SAA and the inverted pendulum. The differences between the two sets of readings, expressed as standard deviations, were within the stated accuracy of the inverted pendulums (0.3 mm). The two instruments will continue to be compared; if the comparisons continue to show a good match, the SAA could become a valuable tool in both automating long term deformation readings, and in avoiding the need for precision drilling to enable inverted pendulum installations.

Source: Danisch, L., et al. (2011) "MEMS-Array Monitoring of a Dam", in Proceeding Canadian Dam Association Annual Conference 2011, Fredericton, NB, Canada, October 15-20.