Solution Mining Research Institute Spring 2017 Technical Conference

Static and Dynamic Effects of a Cavern Pressure Change on an Adjacent Cavern

Pierre Berest[1], Dean Checkai[2], Michel Tijani[3]

[1]LMS, Ecole Polytechnique, France
[2]Fluor Federal Petroleum Operations, LLC, USA
[3]Ecole des Mines de Paris-ParisTech, Fontainebleau, France

Abstract

This paper contains two parts. In the first part, tests performed in SPR oil storage caverns at Big Hill by Checkaï et al. (2014) are reported. Observational data demonstrated that, when a cavern is depressurized, pressure in an adjacent shut-in cavern increases at an accelerated rate. This observation was confirmed by more recent observations. As this phenomenon is slightly counter-intuitive, a mechanical interpretation was looked for. Several models were used. However none of them provides a satisfactory explanation. In the second part, it is proved that, when a Nitrogen MIT is performed in an adjacent cavern, a pressure surge in a cavern should trigger interface oscillations in the cavern experiencing an MIT.

Key words: salt caverns, SPR, interaction between adjacent caverns