

GeoWell: Primary cementing of geothermal wells

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Primary cementing of casing strings or liners is the well construction operation where drilling fluid is displaced from the annular space between casing or liner and formation and replaced by a cement slurry. Effective mobilization and displacement of drilling fluids are recognized as essential steps for successful cementing operations, since incomplete displacement can result in leakage paths along the wellbore, mechanically degraded well cement and casing failure. Geothermal wells are often drilled in weak or fractured formations where the fracture pressure gradient is relatively low. Further, contrary to most oil and gas wells, geothermal wells are often cemented all the way to the surface, resulting in high wellbore pressures and risk of lost circulation during cementing. Narrow margins to the fracturing pressure is a factor that has motivated the reverse circulation primary cementing technique where spacers and cement slurry are injected directly into the annulus to be cemented, resulting in smaller friction pressures during cementing. Compared to conventional primary cementing, reverse circulation places the denser, displacing fluid on top of the lighter fluid to be displaced, potentially resulting in more fluid mixing at the leading edge of the cement. In this presentation we will discuss circulation pressures and annulus displacement mechanics for conventional and reverse primary cementing, and illustrate how computational fluid dynamics can be used to study both types of annulus displacements.