**S1 Table**. Resistivity calibration data for fracture saturation of cylinders used.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Sample  | Frequency (KHz) | Angle (˚) | Impedance (Ω) | Mass sample(g)\* | Resistivity(Ω·cm) | Ratio fracture saturation |
| Simple fracture | 5 | 1 | 966.0 | 1693.4 | 1957.9 | 1.00 |
| 1050.0 | 1692.9 | 2128.2 | 0.88 |
| 1145.0 | 1691.1 | 2320.7 | 0.46 |
| 1457.0 | 1689.1 | 2953.1 | 0.00\*\* |
| Multiple fracture | 5 | 1 | 755.0 | 1617.3 | 1530.3 | 1.00 |
| 800.0 | 1616.3 | 1621.5 | 0.90 |
| 1150.0 | 1610.2 | 2330.9 | 0.26 |
| 1353.0 | 1607.7 | 2742.3 | 0.00\*\* |

\*sample weight includes weight of experimental casing \*\*effective 0% saturation of fracture. Cement matrix was maintained saturated at all times. Samples when dry: Simple fracture 1687.3 g; multiple fracture 1604.1 g

Calculation for resistivity data in S1 Table:

The impedance measurements were made using RCON2 (Giatec Scientific Inc., Ottawa, ON) and converted to resistivity by multiplying the geometry of the monolith.

$ρ=Z∙\frac{A}{L}$ *eqn S1*

Where: ρ = resistivity; Z = impedance; A = cross sectional area; L = length

A linear relationship was generated with the calibration data and used to indirectly determine the saturation of fractures.