

DESCRIPTION OF EROSION RATE TESTING DEVICES AND CORRELATIONS BETWEEN ROCK EROSION RATE AND COHESION

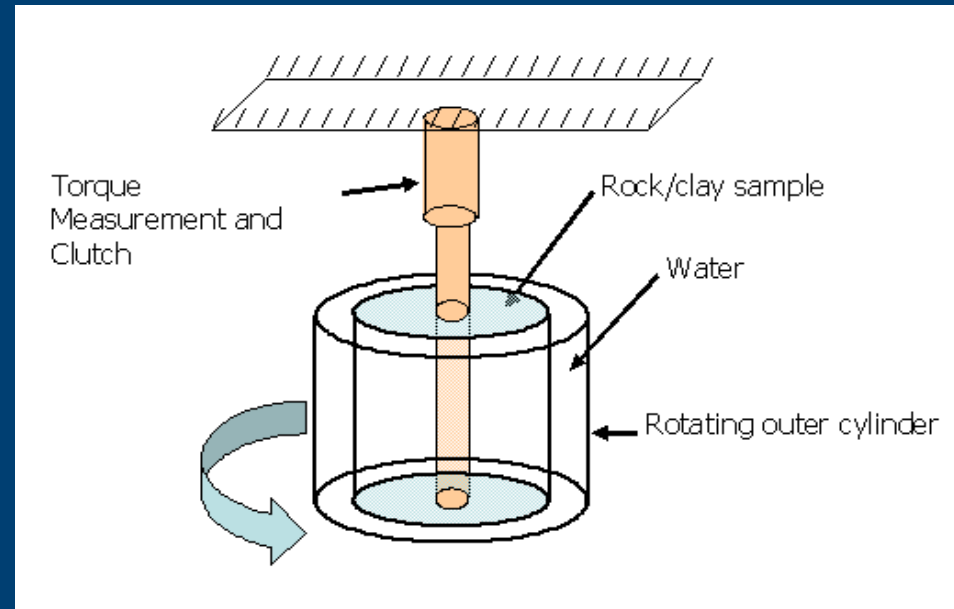
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Rotating Erosion Testing Apparatus (RETA)

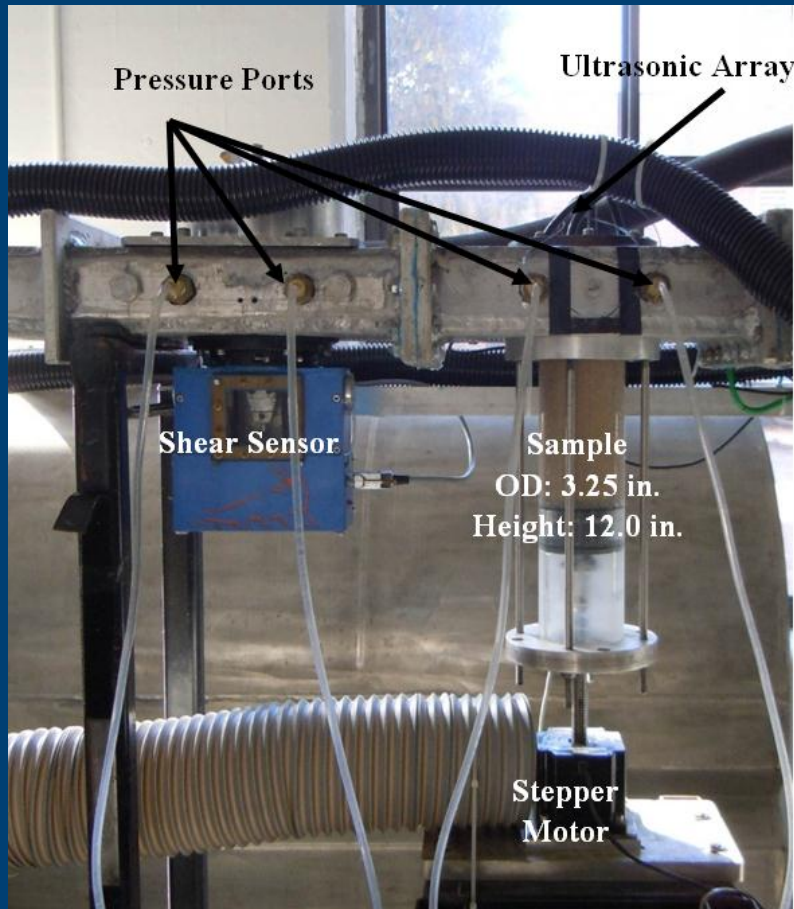


Photograph of RETA

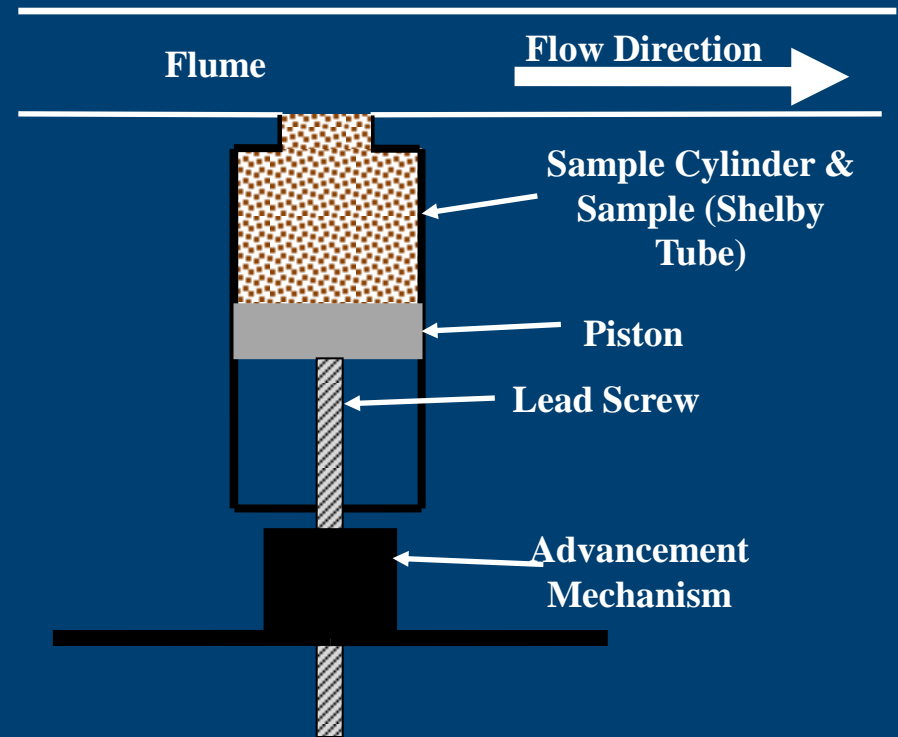


Schematic Drawing of RETA

Sediment Erosion Rate Flume (SERF)

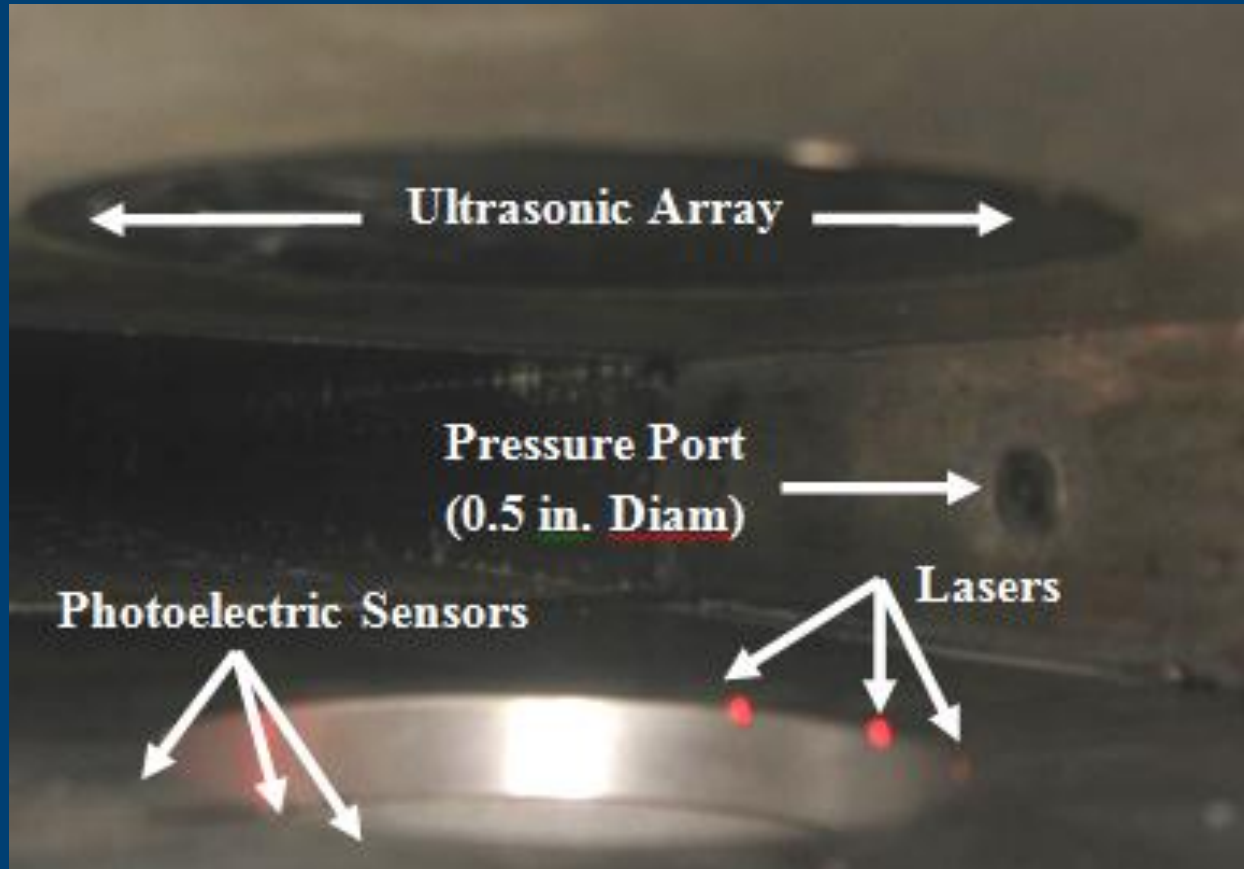


Photograph of SERF



Schematic Drawing of SERF

SERF Unique Features



Inside the SERF

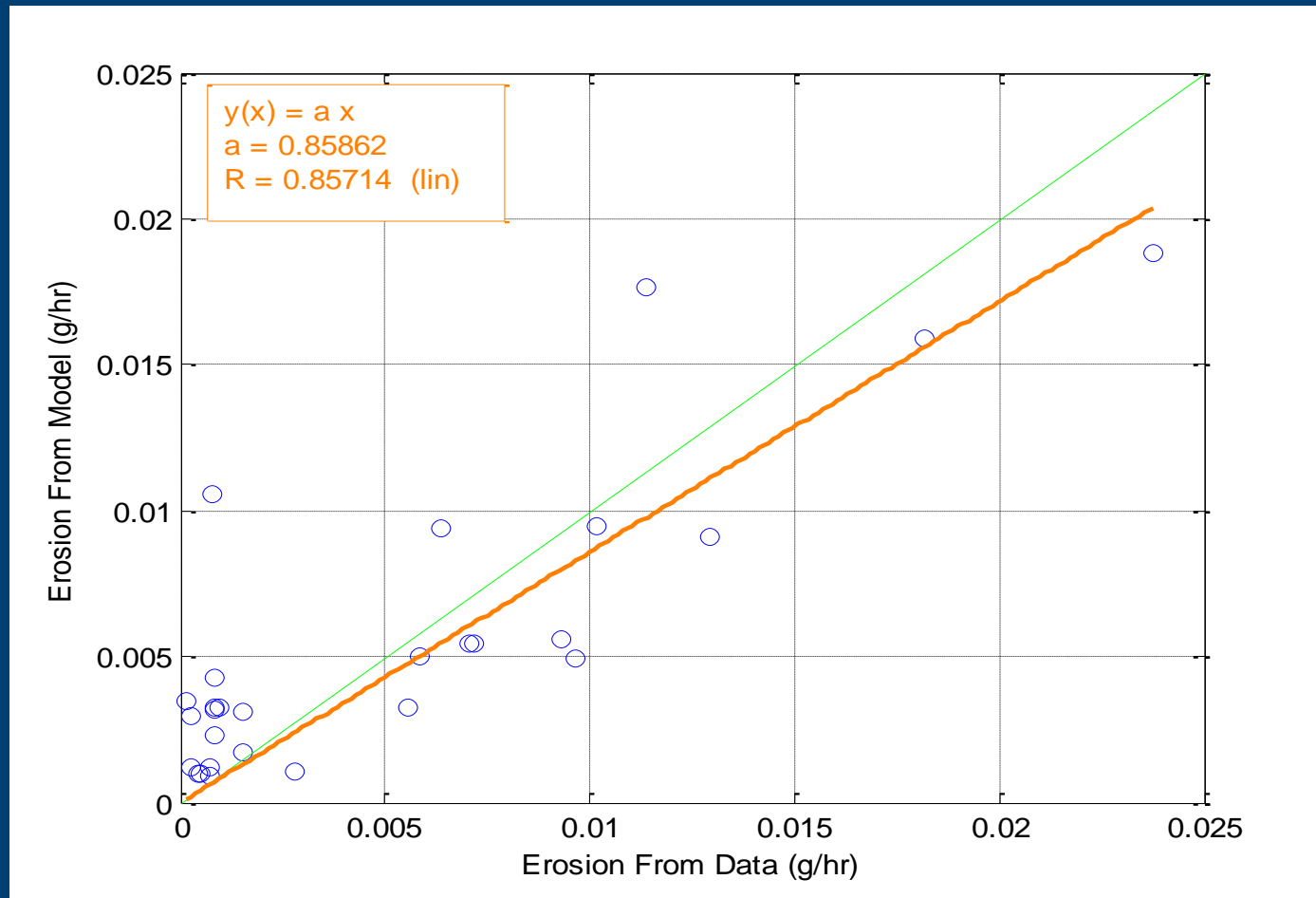
Erosion as a Function of Cohesion

- Intuitively, Erosion should be function of material strength
 - Slagle (2006): $E = kC^{-n}$; as $C \rightarrow 0$, $E \rightarrow 0$
 - $E =$ Erosion Rate; $C =$ Cohesion, $k, n =$ Correlation constants
- $E = M(\tau_b - \tau_c)$
 - Can Slagle's apparent correlation be made to appear like known relationship?
 - $M =$ Material Constant; $\tau_b =$ Bed Shear Stress; $\tau_c =$ Critical SS

Erosion as a Function of Cohesion

- Rock obtained from Aucilla River, FL; Mill Creek, OR, Jewfish Creek, FL
- Erosion Function was approximated as $E = N\tau_b - Z$
 - $N, Z =$ Erosion constants
- Instead of correlating τ_c to C , N and Z were correlated separately
 - $N, Z = a + b \exp\left(\frac{-C}{c}\right)$, $a, b, c =$ correlation coefficients

New Model Results



Measured vs. Modeled Results

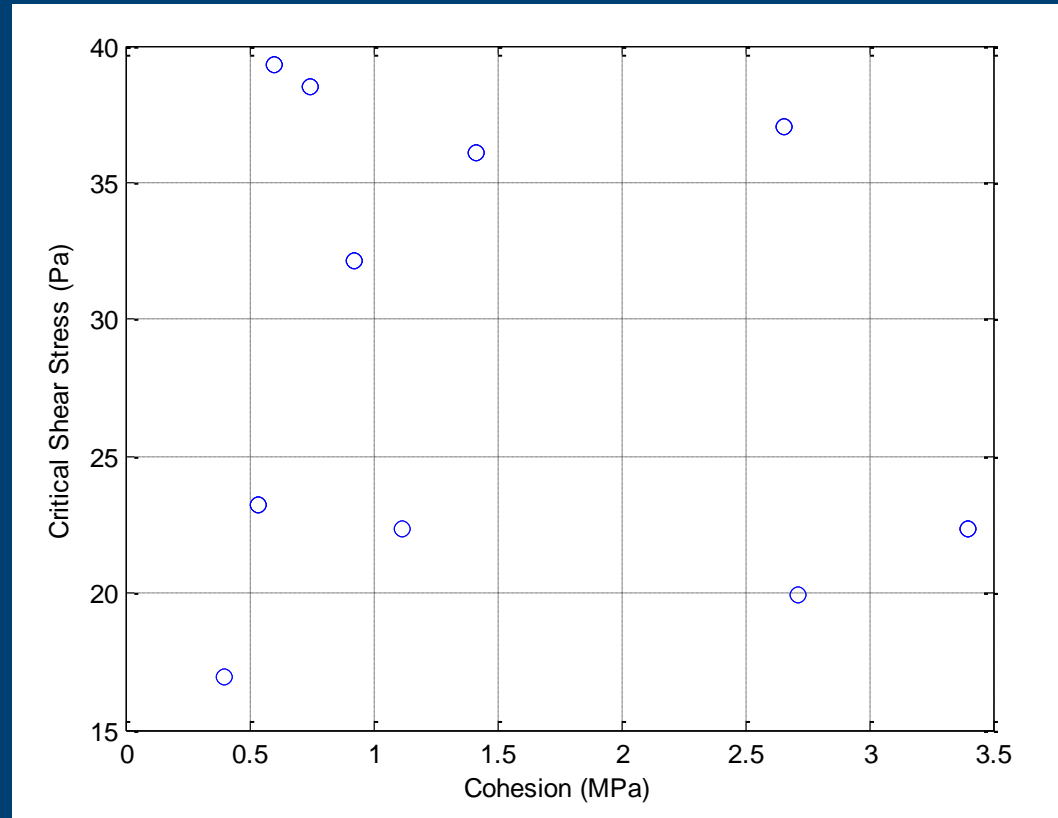
Analysis of New Model

- $E = N\tau_b - Z$

- $N = a_1 + b_1 e^{C/c_1}$

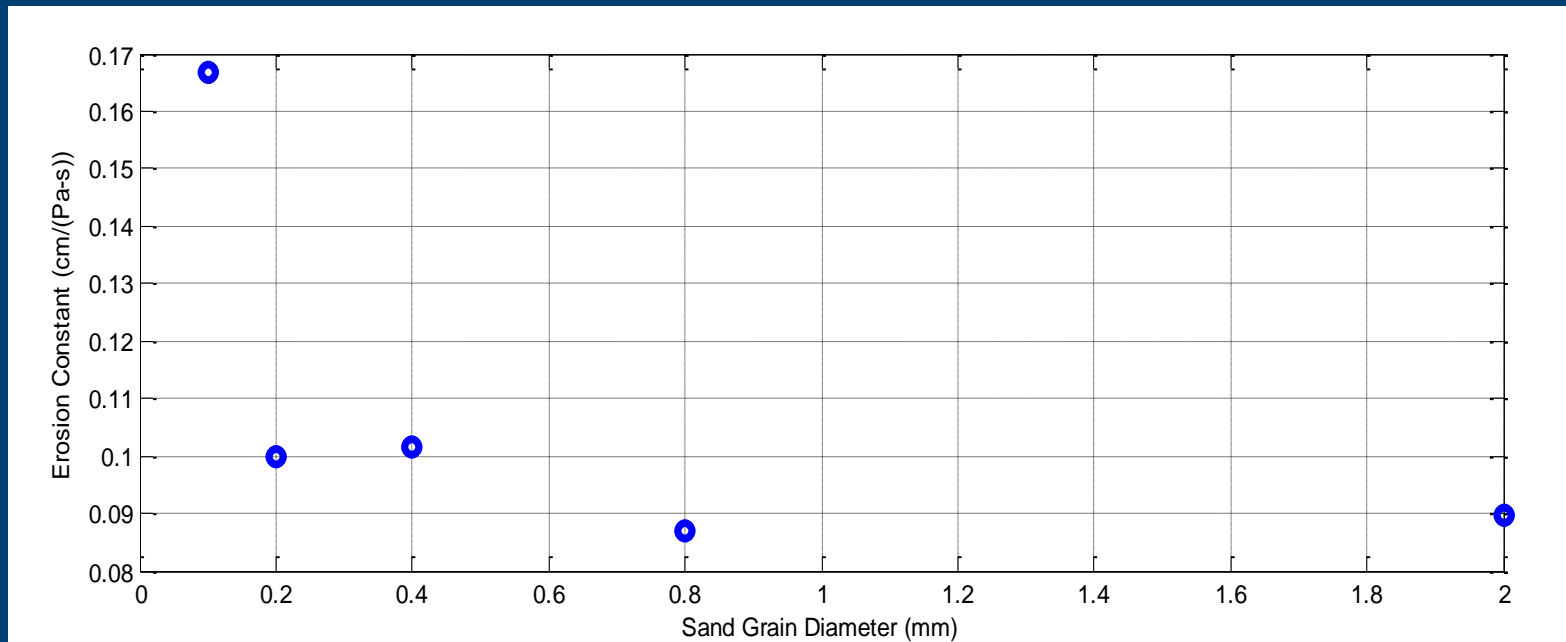
- $Z = a_2 + b_2 e^{C/c_2}$

- $E = N \left(\tau_b - \frac{Z}{N} \right)$



Critical Shear Stress vs. Cohesion

Issues with New Model



Erosion Constant as a Function of Grain Size using SERF Data



DISCUSSION

