# LIST OF ABBREVIATIONS

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Abbreviation</th>
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<tbody>
<tr>
<td>$CO_2$</td>
<td>Carbon Dioxide</td>
</tr>
<tr>
<td>GGBFS</td>
<td>Ground Granulated Blast Furnace Slag</td>
</tr>
<tr>
<td>HSC</td>
<td>High Strength Concrete</td>
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<tr>
<td>HPC</td>
<td>High Performance Concrete</td>
</tr>
<tr>
<td>IAPST</td>
<td>Index Of Aggregate Particle Shape And Texture</td>
</tr>
<tr>
<td>ASTM</td>
<td>American Standard Testing Methods</td>
</tr>
<tr>
<td>IS</td>
<td>Indian Standard</td>
</tr>
<tr>
<td>AASHTO</td>
<td>American Association of State Highway and Transportation Officials</td>
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<tr>
<td>L</td>
<td>Length</td>
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<tr>
<td>W</td>
<td>Width</td>
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<td>T</td>
<td>Thickness</td>
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<td>H</td>
<td>Height</td>
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<tr>
<td>E</td>
<td>Elongation Index</td>
</tr>
<tr>
<td>F</td>
<td>Flakiness Index</td>
</tr>
<tr>
<td>DIP</td>
<td>Digital Image Processing</td>
</tr>
<tr>
<td>DOE</td>
<td>Department Of Environment Method</td>
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<tr>
<td>ACI</td>
<td>American Concrete Institute</td>
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<tr>
<td>LPDM</td>
<td>Linear Packing Density Model</td>
</tr>
<tr>
<td>LMPM</td>
<td>Linear Mixture Packing Model</td>
</tr>
<tr>
<td>$f'_{cr}$</td>
<td>(Target) Average Compressive Strength</td>
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</table>
\( k \)  Empirical Factor  
\( f'_c \)  Design Compressive Strength  
W/C  Water Cement Ratio  
NMSA  Nominal maximum size of aggregate  
\( F_{\text{agg}} \)  Fine Aggregate  
HRWR  High Range Water reducer  
\( d \)  Particle Diameter Being Considered [M]  
\( d_{\text{max}} \)  Maximum Particle Diameter In The Mixture  
\( P(d) \)  Size Cumulative Distribution Function  
\( q \)  \( Q \) Parameter (0.33-0.5) Which Adjusts The Curve For Fineness Or Coarseness  
\( d_0 \)  The Minimum Particle Size Of Distribution  
\( d_1/d_2 \)  Ratios of Fine to Coarse Particle  
D  The Maximum Particle Size  
AFDZ  Andreassen, Funk, Dinger and Zheng  
EMMA  Elekem materials mixture analyseri  
TPM  Theory Of Particle Mixture  
\( \eta_r \)  Relative Viscosity  
\( \phi \)  Volume Fraction Of The Suspended Spheres  
\( k \)  Constant  
\( \lambda_{ij} \)  A Variable Factor  
LPDM  Linear Packing Density Model  
\( \beta \)  The maximum packing density achievable with a given mixture, by keeping each
particle in its original shape and placed one by one of a mixture

\[ d_f \]  Size of Finer Particle

\[ d_c \]  Size of Coarser Particle

SSM  Solid Suspension Model

CPM  Compressive Packing Model

MLPM  Modified Linear Packing Model

\[ r \]  Size Ratio between the Components

\[ j \]  Evaluated as the ratio of the size of the smaller size component to the size of the larger size component

\[ L(r) \]  and \[ w(r) \]  Interaction functions accounting for loosening and wall effects as per Yu

\[ EL(r) \]  and \[ Ew(r) \]  Interaction functions accounting for loosening and wall effects as per proposed Theory

OPC  Ordinary Portland Cement

CSF  Condensed Silica Fume

C  Cement

SF  Silica Fume

w/p  Water to Powder Ratio

g  Yield Value

NSC  Normal Strength Concrete

HCS  Highest Compressive Strength

DEM  Discrete Element Modelling

SP  Super Plasticiser
<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tr>
<td>IAPST</td>
<td>Index Of Aggregate Particle Shape And Texture</td>
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<tr>
<td>Sphericity</td>
<td>Sphericity</td>
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<tr>
<td>Si</td>
<td>Angularity Index</td>
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<td>DIP</td>
<td>Digital Image Processing</td>
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<tr>
<td>VDG</td>
<td>Video Grader</td>
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<tr>
<td>SCAR</td>
<td>Shape Class Average Ratio</td>
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<tr>
<td>FF</td>
<td>Form Factor</td>
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<tr>
<td>LASS</td>
<td>Laser-Based Aggregate Scanning System</td>
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<td>ITZ</td>
<td>Interfacial Transition Zone</td>
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<tr>
<td>LPT</td>
<td>Local Porosity Theory</td>
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<td>AI</td>
<td>Angularity Index</td>
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<tr>
<td>ST</td>
<td>Surface Texture</td>
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<tr>
<td>F and E</td>
<td>Flat and Elongated Ratio</td>
</tr>
<tr>
<td>DIPAM</td>
<td>Digital Image Processing Based Aggregate Measurement System</td>
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<tr>
<td>LED</td>
<td>Light Emitting Diode</td>
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<tr>
<td>PWM</td>
<td>Pulse Width Modulation</td>
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<tr>
<td>CPM</td>
<td>Compressible Packing Model</td>
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<tr>
<td>OPC</td>
<td>Ordinary Portland Cement</td>
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</table>

$r$ Ratio of Equivalent Packing Diameter of Fine Aggregate

$d_p$ Equivalent packing diameter

$d_{pi}$ Equivalent Packing Diameter of Coarse Aggregate

$d_{pj}$ Equivalent Packing Diameter of Fine Aggregate
\( a_{ij} \) Loosening Effect by De Larrard

\( b_{ij} \) Wall Effect by De Larrard

\( \lambda \) A parameter dependent on the flakiness of the aggregate

\( K \) Compaction Index

\( k_w \) Constant of Angularity

CA/FA Coarse Aggregates to Fine Aggregates Ratio

ST Surface Texture Parameter For Each Image

\( L \) Longest Or Maximum Intercept Of A Particle In Image

\( \beta \) Scaling Factor For Erosion And Dilation Operations.

\( A_1 \) and \( A_2 \) Areas of the objects before and after applying the erosion - dilation operations, respectively

SCAR Shape Class Average Ratio

SPACE Software Package for the Assessment of Compositional Evolution

DFXTRACT A Program

SP Surface Parameter

FF Form factor

\( R \) Radius of the particle in different directions

\( \theta \) Directional Angle

\( R_{p\theta} \) Radius of the particle at a directional angle \( \theta \)

\( R_{EE\theta} \) Radius of an Equivalent ellipse at a directional angle \( \theta \)