LIST OF SYMBOLS

$A_j$ Zernike moment feature vector of $j$-th block

$A_{pq}$ Angular radial transform of order $p$ and repetition $q$

$A_q$ Angular part of moment or transform basis function

$B$ Watermark bit sequence

$b_i$ $i$-th Watermark bit

$\hat{b}_i$ An estimate of $i$-th watermark bit or extracted bit

$C(.)$ Fresnel C integral

$D$ Diameter of the circular disk for the computation of moments or transforms

$D$ Degradation operator

$d_i(.)$ $i$-th dither vector value

$f(x,y)$ Image function

$\hat{f}(x,y)$ Reconstructed image function

$f_{\text{wat}}(x,y)$ Watermarked image function

$F_{pq}$ Moment or transform coefficient

$F_{pq}^{PCE}$ Polar complex exponential transform of order $p$ and repetition $q$

$F_{pq}^{PCT}$ Polar cosine transform of order $p$ and repetition $q$

$F_{pq}^{PST}$ Polar sine transform of order $p$ and repetition $q$

$H$ Host data set consisting of all moments or transforms coefficients computed up to given order and repetition
$H_{pq}$  Radial harmonic Fourier moment of order $p$ and repetition $q$

$I$  Host or cover media

$I'$  Fake original media

$I_w$  Watermarked media

$I'_w$  Watermarked version of fake original media

$I'_w$  Attacked watermarked media

$k$  Intensity of constant image function

$L$  Length of watermark bit sequence

$L_{max}$  Maximum length of watermark bit sequence

$M_{pq}$  Fourier-Mellin moment of order $p$ and repetition $q$

$m$  An integer

$m_{pq}$  Geometric moment of order $p$ and repetition $q$

$N$  Length or width of image

$n$  Order of integration for Gaussian numerical integration

$O_{pq}$  Orthogonal Fourier-Mellin moment of order $p$ and repetition $q$

$p$  Order of a moment or transform

$p_{max}$  Maximum order for a moment or transform

$Q$  JPEG Quality factor

$q$  Repetition of a moment or transform

$q_{max}$  Maximum repetition for a moment or transform

$R$  Radius of the disk

$R_{pq}$  Radial part of moment or transform basis function

$R_p^{ART}$  Radial basis function of angular radial transform

$R_p^{FMM}$  Radial basis function of Fourier Mellin moment

$R_p^{OFMM}$  Radial basis function of orthogonal Fourier Mellin moment
\( R^{PCET}_p \) Radial basis function of polar complex exponential transform

\( R^{PCT}_p \) Radial basis function of polar cosine transform

\( R^{PST}_p \) Radial basis function of polar sine transform

\( R^{PZM}_{pq} \) Radial basis function of pseudo-Zernike moment

\( R^{RHFHM}_p \) Radial basis function of radial harmonic Fourier moment

\( R^{ZM}_{pq} \) Radial basis function of Zernike moment

\( r \) Radius of the coordinate position \((x,y)\)

\( S(.) \) Fresnel S integral

\( S \) Data embedding set consisting of all moments or transforms coefficients that can be used for embedding

\( t_i \) Locations for Gaussian numerical integration

\( V_{pq} \) Moment or transform basis function

\( Z_{pq} \) Zernike moment of order \( p \) and repetition \( q \)

\( w \) Watermark

\( w' \) Fake watermark

\( w(x,y) \) Spatial watermark signal

\( w_i \) Weights for Gaussian numerical integration

\( \varepsilon \) Mean square reconstruction error (MSRE)

\( \varepsilon_{p,q_i} \) Quantization noise signal corresponding to \( i-th \) bit

\( \mu_{pq} \) Central moment of order \( p \) and repetition \( q \)

\( \Delta \) Quantization step size

\( \delta \) Kronecker delta

\( \theta \) Angle of the coordinate position \((x,y)\)

\( \lambda \) Normalization factor for moments or transforms

\( \varphi \) Angle of rotation