WHAT IS CLAIMED IS:

1. A method of video decoding performed in a video decoder, comprising:

receiving a first syntax element from a bitstream of a coded video indicating whether residual blocks of a current coding unit (CU) are processed with a color space conversion, the residual blocks of the current CU including a luma residual block, a first chroma residual block, and a second chroma residual block;

in response to the first syntax element indicating that the residual blocks of the current CU are processed with the color space conversion,

applying, based on a transform skip flag corresponding to each of the residual blocks of the current CU having a value of 1 and a quantization parameter (QP) corresponding to each of the residual blocks of the current CU having a value of 4, an inverse color space conversion using a first option of color space conversion equations to the residual blocks of the current CU to generate modified versions of the residual blocks of the current CU, wherein:

the first option of the color space conversion equations includes:

tmp = rY[ x ][ y ] – ( rCb[ x ][ y ] >> 1 ),

rY[ x ][ y ] = tmp + rCb[ x ][ y ],

rCb[ x ][ y ] = tmp – ( rCr[ x ][ y ] >> 1 ), and

rCr[ x ][ y ] = rCb[ x ][ y ] + rCr[ x ][ y ]; and

inputs to the first option of the color space conversion equations include:

an array of luma residual samples of the luma residual block with elements rY[ x ][ y ],

an array of chroma residual samples of the first chroma residual block with elements rCb[ x ][ y ], and

an array of chroma residual samples of the second chroma residual block with elements rCr[ x ][ y ]; and

outputs from the first option of the color space conversion equations include:

a modified array of luma residual samples of the luma residual block with elements rY[ x ][ y ],

a modified array of chroma residual samples of the first chroma residual block with elements rCb[ x ][ y ], and

a modified array of chroma residual samples of the second chroma residual block with elements rCr[ x ][ y ].

2. The method of claim 1, further comprising:

in response to the first syntax element indicating that the residual blocks of the current CU are processed with the color space conversion, selecting one of two options of color space conversion equations, wherein

the two options of color space conversion equations include:

the first option of color space conversion equations, and

a second option of color space conversion equations including:

tmp = rY[ x ][ y ] - rCb[ x ][ y ],

rY[ x ][ y ] = rY[ x ][ y ] + rCb[ x ][ y ],

rCb[ x ][ y ] = tmp – rCr[ x ][ y ], and

rCr[ x ][ y ] = tmp + rCr[ x ][ y ],

inputs to the second option of the color space conversion equations include:

an array of luma residual samples of the luma residual block with elements rY[ x ][ y ],

an array of chroma residual samples of the first chroma residual block with elements rCb[ x ][ y ], and

an array of chroma residual samples of the second chroma residual block with elements rCr[ x ][ y ]; and

outputs from the second option of color space conversion equations include:

a modified array of luma residual samples of the luma residual block with elements rY[ x ][ y ],

a modified array of chroma residual samples of the first chroma residual block with elements rCb[ x ][ y ], and

a modified array of chroma residual samples of the second chroma residual block with elements rCr[ x ][ y ].

3. The method of claim 2, wherein the selecting one of the two options of the color space conversion equations includes:

selecting the second option of the color space conversion equations when at least one of transform skip flags corresponding to the residual blocks of the current CU has a value of 0.

4. The method of claim 2, wherein the selecting one of the two options of the color space conversion equations includes:

selecting the second option of the color space conversion equations when at least one of the QPs corresponding to the residual blocks of the current CU has a value not equal to 4.

5. The method of claim 2, further comprising:

receiving a second syntax element indicating only the first option of color space conversion equations is applied, the second syntax element is one of a slice level syntax element, a picture level syntax element, or a sequence level syntax element.

6. The method of claim 2, further comprising:

receiving a second syntax element indicating only the first option of color space conversion equations is applied irrespective of a value of a flag indicating whether transform and quantization are bypassed for residuals of a CU, the second syntax element is one of a slice level syntax element, a picture level syntax element, or a sequence level syntax element.

7. The method of claim 1, further comprising:

selecting one of the two options of the color space conversion equations for processing a CU according to a variable indicating whether a block-based differential pulse code modulation (BDPCM) is applied to the CU.

8. The method of claim 1, further comprising:

determining no color space conversion is applied to residual blocks of a CU when a bit depth of luma samples of the CU is different from a bit depth of chroma samples of the CU.

9. The method of claim 1, further comprising:

determining no color space conversion is applied to residual blocks of a CU when a bit depth of luma samples of the CU is different from a bit depth of chroma samples of the CU, and a transform skip flag corresponding to each of the residual blocks of the CU has a value of 1 or 0.

10. The method of claim 1, further comprising:

determining no color space conversion is applied to residual blocks of a CU when a bit depth of luma samples of the CU is different from a bit depth of chroma samples of the CU, a QP corresponding to each of the residual blocks of the CU has a value of 4, and a transform skip flag corresponding to each of the residual blocks of the CU has a value of 1 or 0.

11. An apparatus of video decoding, comprising circuitry configured to perform the method according to any one of claims 1 to 10.

12. A non-transitory computer-readable medium storing instructions that, when executed by a processor, cause the processor to perform the method according to any one of claims 1 to 10.