Image Analysis Using Numpy & Matplotlib

In [ ]:
```
import numpy as np
```

In [2]:
```
ones_arr = np.ones((5,5))
```

In [3]:
```
ones_arr
```

Out[3]:
```
array([[1., 1., 1., 1., 1.],
       [1., 1., 1., 1., 1.],
       [1., 1., 1., 1., 1.],
       [1., 1., 1., 1., 1.],
       [1., 1., 1., 1., 1.]])
```

In [4]:
```
ones_arr = np.ones((5,5), dtype=int)
```

In [5]:
```
ones_arr
```

Out[5]:
```
array([[1, 1, 1, 1, 1],
       [1, 1, 1, 1, 1],
       [1, 1, 1, 1, 1],
       [1, 1, 1, 1, 1],
       [1, 1, 1, 1, 1]])
```

In [6]:
```
zeros_arr = np.zeros((3,3), dtype =int)
```

In [7]:
```
zeros_arr
```

Out[7]:
```
array([[0, 0, 0],
       [0, 0, 0],
       [0, 0, 0]])
```

In [8]:
```
ones_arr
```

Out[8]:
```
array([[1, 1, 1, 1, 1],
       [1, 1, 1, 1, 1],
       [1, 1, 1, 1, 1],
       [1, 1, 1, 1, 1],
       [1, 1, 1, 1, 1]])
```

In [9]:
```
ones_arr*255
```

Out[9]:
```
array([[255, 255, 255, 255, 255],
       [255, 255, 255, 255, 255],
       [255, 255, 255, 255, 255],
       [255, 255, 255, 255, 255],
       [255, 255, 255, 255, 255]])
```

In [10]:
```
import matplotlib.pyplot as plt
```

In [11]:
```
%matplotlib inline
```

In [12]:
```
from PIL import Image    # Python imaging library
```

In [13]:
```
img1 = Image.open("Shivaji Maharaj Fort.jpeg")
```

In [14]:
```
img1
```

Out[14]:

In [15]:
```
type(img1)
```

Out[15]:
```
PIL.JpegImagePlugin.JpegImageFile
```

In [16]:
```
fort_img = np.asarray(img1)
fort_img
```

Out[16]:
```
array([[[162, 199, 207],
        [163, 197, 206],
        [163, 197, 206],
        ...,
        [167, 197, 205],
        [165, 195, 203],
        [165, 195, 203]],

       [[161, 198, 207],
        [163, 197, 207],
        [162, 196, 206],
        ...,
        [165, 195, 203],
        [165, 195, 203],
        [165, 195, 203]],

       [[161, 195, 205],
        [161, 195, 205],
        [161, 195, 205],
        ...,
        [164, 194, 202],
        [165, 195, 203],
        [165, 195, 203]],

       ...,

       [[ 64,  73,  52],
        [104, 113,  92],
        [149, 159, 135],
        ...,
        [ 55,  47,  34],
        [128, 120, 101],
        [183, 172, 150]],

       [[ 75,  84,  63],
        [124, 134, 110],
        [124, 136, 112],
        ...,
        [ 69,  59,  47],
        [141, 130, 112],
        [157, 142, 121]],

       [[ 91, 103,  79],
        [115, 128, 102],
        [122, 135, 109],
        ...,
        [ 92,  80,  68],
        [134, 121, 105],
        [133, 118,  97]]], dtype=uint8)
```

In [17]:
```
type(fort_img)
```

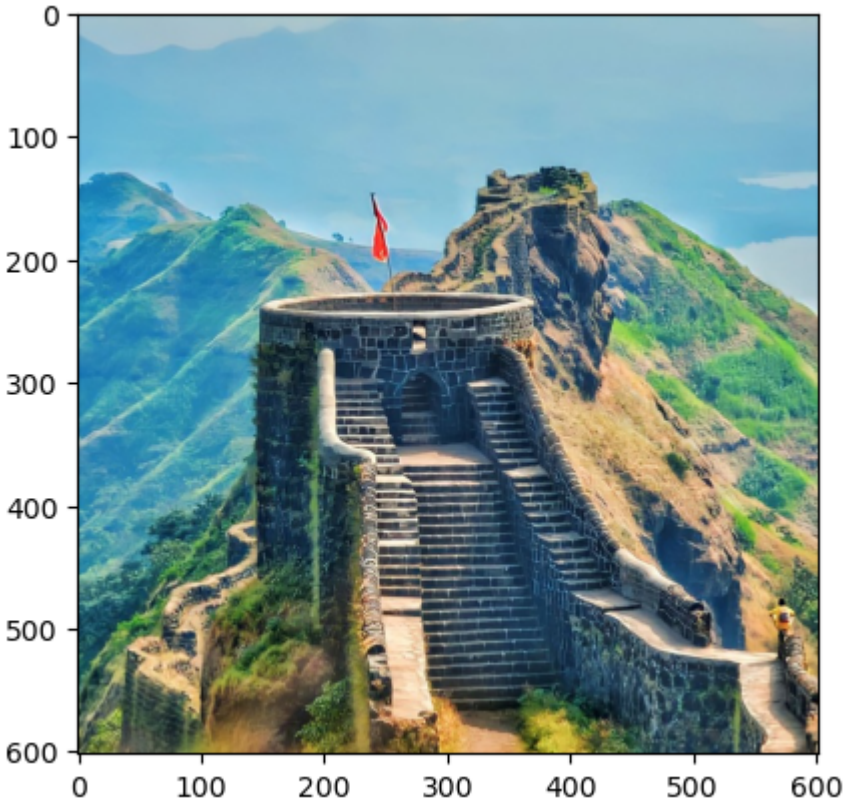
Out[17]:
```
numpy.ndarray
```

In [18]:
```
fort_img.shape
```

Out[18]:
```
(602, 602, 3)
```

In [19]:
```
plt.imshow(fort_img)
```

Out[19]: <matplotlib.image.AxesImage at 0x22fbb982e50>



In [20]:
```
fort_copy = fort_img.copy()
```

In [21]:
```
fort_copy
```

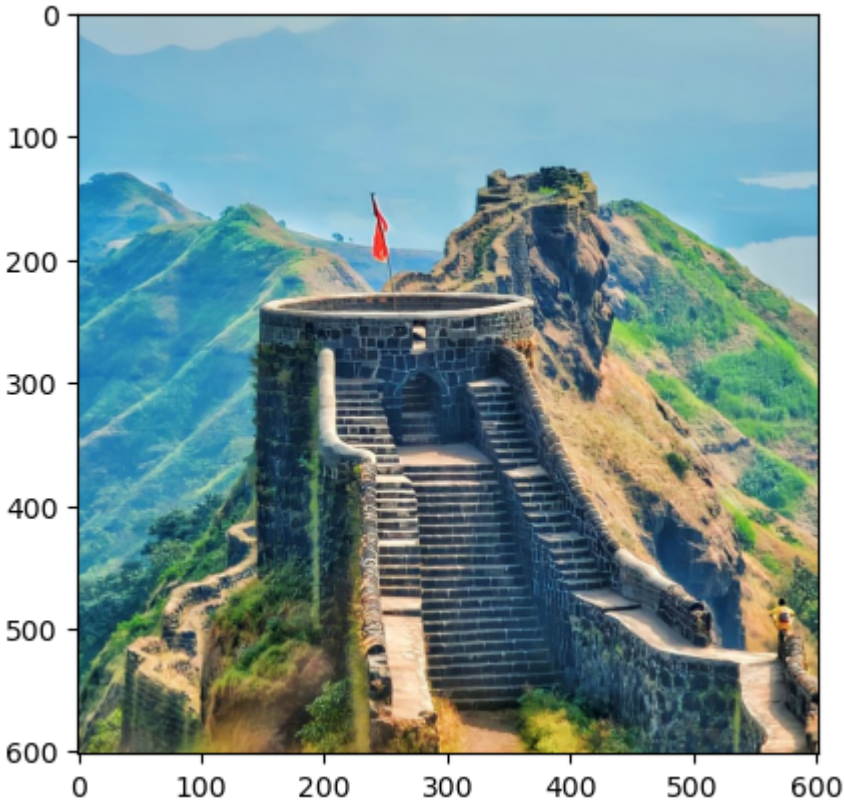
Out[21]:
```
array([[[162, 199, 207],
        [163, 197, 206],
        [163, 197, 206],
        ...,
        [167, 197, 205],
        [165, 195, 203],
        [165, 195, 203]],

       [[161, 198, 207],
        [163, 197, 207],
        [162, 196, 206],
        ...,
        [165, 195, 203],
        [165, 195, 203],
        [165, 195, 203]],

       [[161, 195, 205],
        [161, 195, 205],
        [161, 195, 205],
        ...,
        [164, 194, 202],
        [165, 195, 203],
        [165, 195, 203]],

       ...,

       [[ 64,  73,  52],
        [104, 113,  92],
        [149, 159, 135],
        ...,
        [ 55,  47,  34],
        [128, 120, 101],
        [183, 172, 150]],

       [[ 75,  84,  63],
        [124, 134, 110],
        [124, 136, 112],
        ...,
        [ 69,  59,  47],
        [141, 130, 112],
        [157, 142, 121]],

       [[ 91, 103,  79],
        [115, 128, 102],
        [122, 135, 109],
        ...,
        [ 92,  80,  68],
        [134, 121, 105],
        [133, 118,  97]]], dtype=uint8)
```

In [22]:
```
fort_copy == fort_img
```

Out[22]:
```
array([[[ True,  True,  True],
        [ True,  True,  True],
        [ True,  True,  True],
        ...,
        [ True,  True,  True],
        [ True,  True,  True],
        [ True,  True,  True]],

       [[ True,  True,  True],
        [ True,  True,  True],
        [ True,  True,  True],
        ...,
        [ True,  True,  True],
        [ True,  True,  True],
        [ True,  True,  True]],

       [[ True,  True,  True],
        [ True,  True,  True],
        [ True,  True,  True],
        ...,
        [ True,  True,  True],
        [ True,  True,  True],
        [ True,  True,  True]],

       ...,

       [[ True,  True,  True],
        [ True,  True,  True],
        [ True,  True,  True],
        ...,
        [ True,  True,  True],
        [ True,  True,  True],
        [ True,  True,  True]],

       [[ True,  True,  True],
        [ True,  True,  True],
        [ True,  True,  True],
        ...,
        [ True,  True,  True],
        [ True,  True,  True],
        [ True,  True,  True]],

       [[ True,  True,  True],
        [ True,  True,  True],
        [ True,  True,  True],
        ...,
        [ True,  True,  True],
        [ True,  True,  True],
        [ True,  True,  True]]])
```

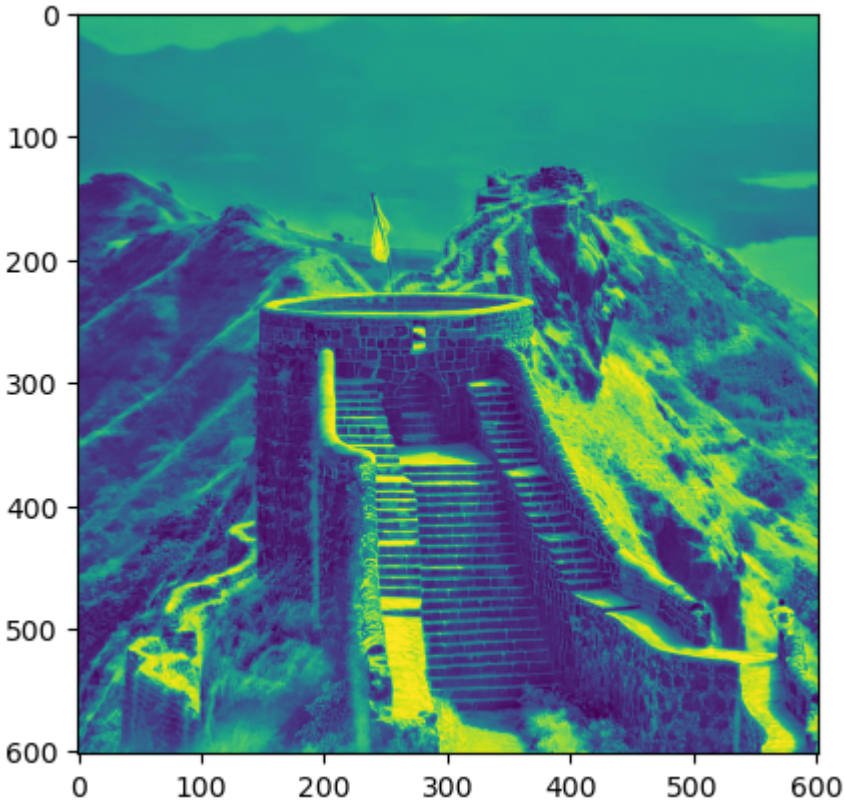
In [23]:
```
plt.imshow(fort_copy)
```

Out[23]:
```
<matplotlib.image.AxesImage at 0x22fbbaf8dd0>
```



In [24]:
```
plt.imshow(fort_copy[:,:,0])
```

Out[24]: <matplotlib.image.AxesImage at 0x22fbbaf0a10>

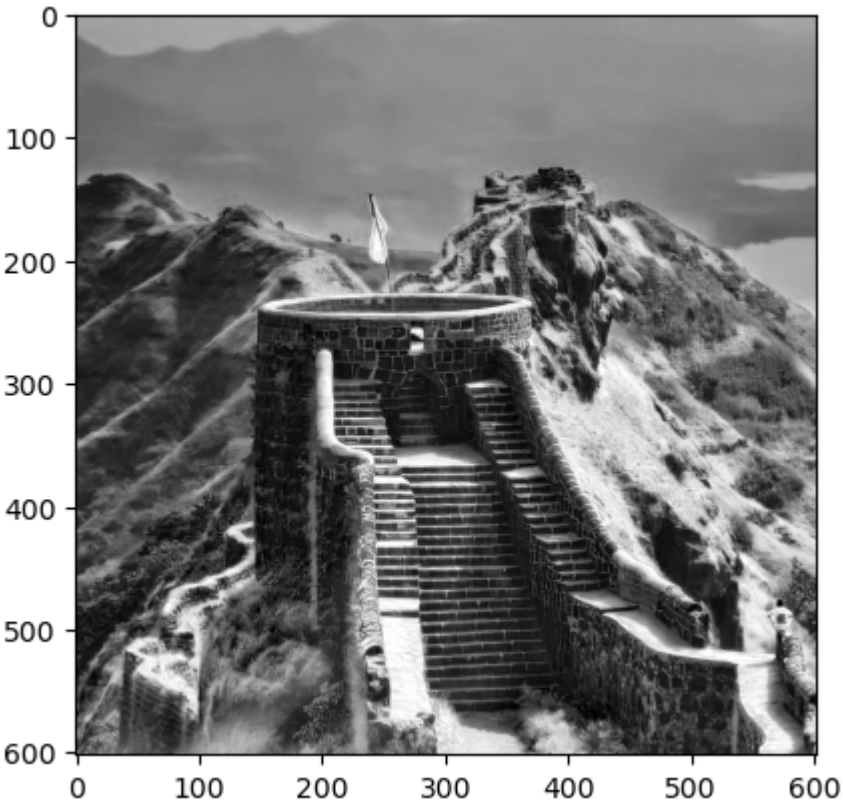


In [25]:
```
fort_copy[:,:,0]
```

Out[25]:
```
array([[162, 163, 163, ..., 167, 165, 165],
       [161, 163, 162, ..., 165, 165, 165],
       [161, 161, 161, ..., 164, 165, 165],
       ...,
       [ 64, 104, 149, ...,  55, 128, 183],
       [ 75, 124, 124, ...,  69, 141, 157],
       [ 91, 115, 122, ...,  92, 134, 133]], dtype=uint8)
```

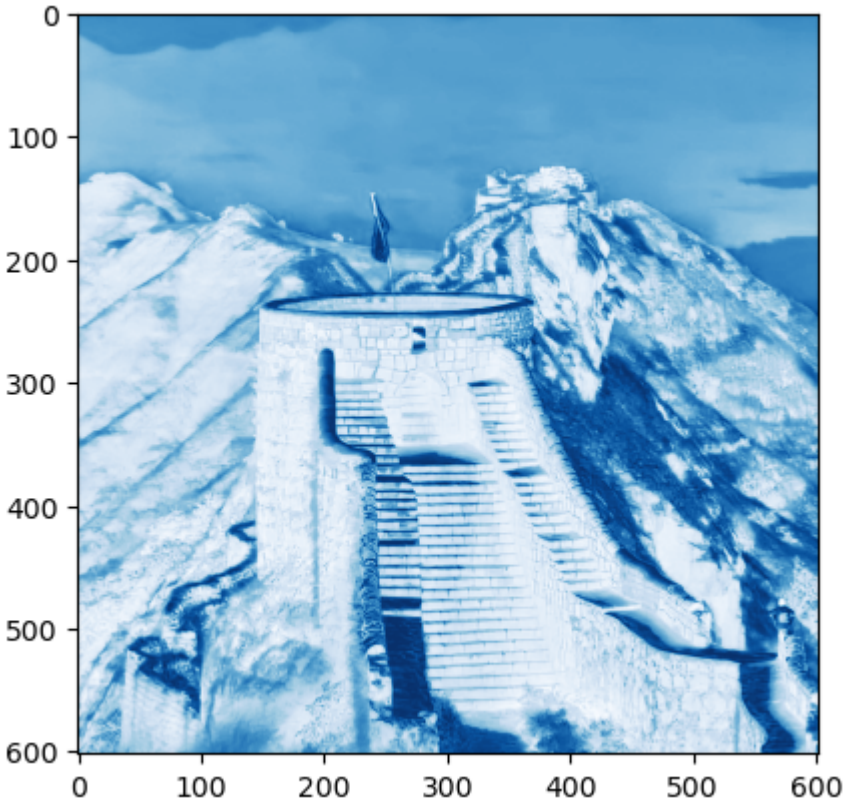
In [26]:
```
plt.imshow(fort_copy[:,:,0], cmap='gray')
```

Out[26]:
```
<matplotlib.image.AxesImage at 0x22fbd1a9ad0>
```



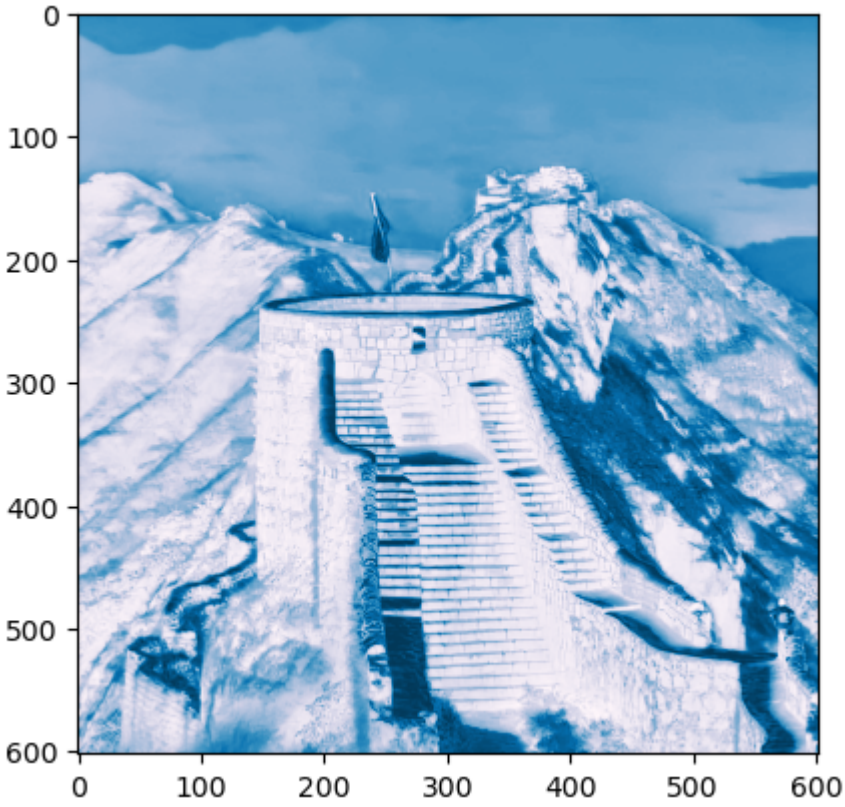
In [27]:
```
plt.imshow(fort_copy[:,:,0], cmap='Blues')
```

Out[27]:
```
<matplotlib.image.AxesImage at 0x22fbd3824d0>
```



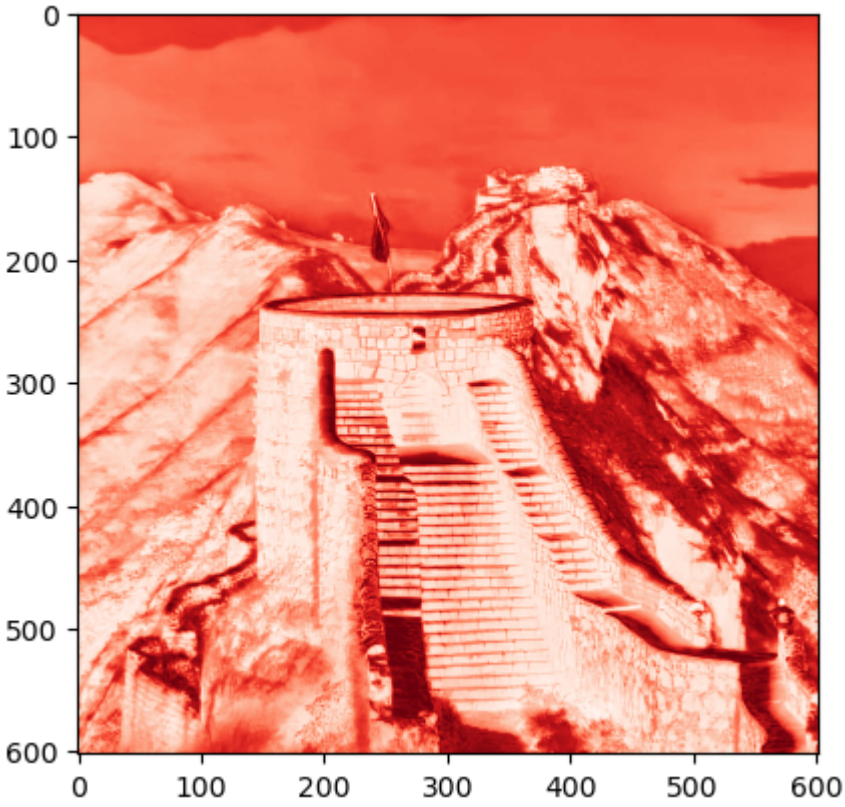
In [56]:
```
plt.imshow(fort_copy[:,:,0], cmap='PuBu')
```

Out[56]: <matplotlib.image.AxesImage at 0x22fbea60e50>



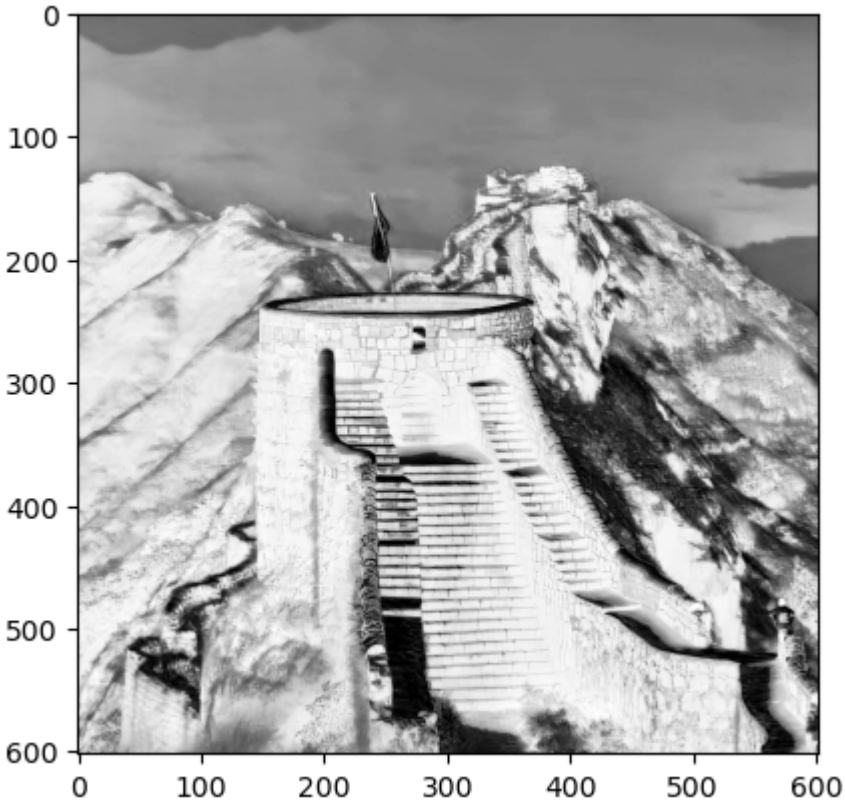
In [29]:
```
plt.imshow(fort_copy[:,:,0], cmap='Reds')
```

Out[29]: <matplotlib.image.AxesImage at 0x22fbd5bfd10>



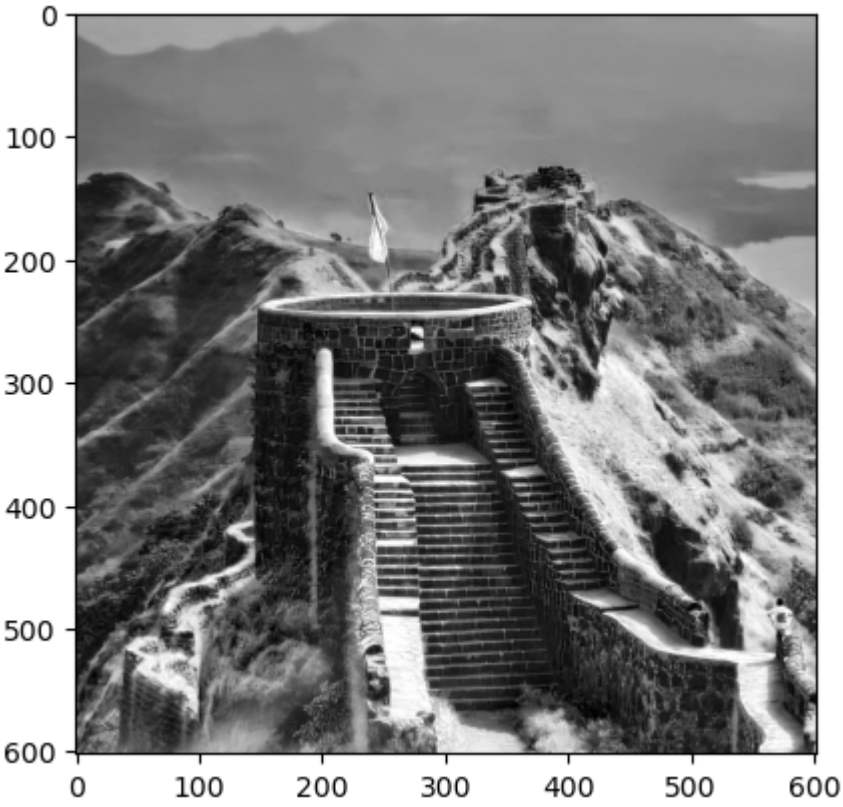
In [30]:
```
plt.imshow(fort_copy[:,:,0], cmap='Greys')
```

Out[30]: <matplotlib.image.AxesImage at 0x22fbd64dd50>



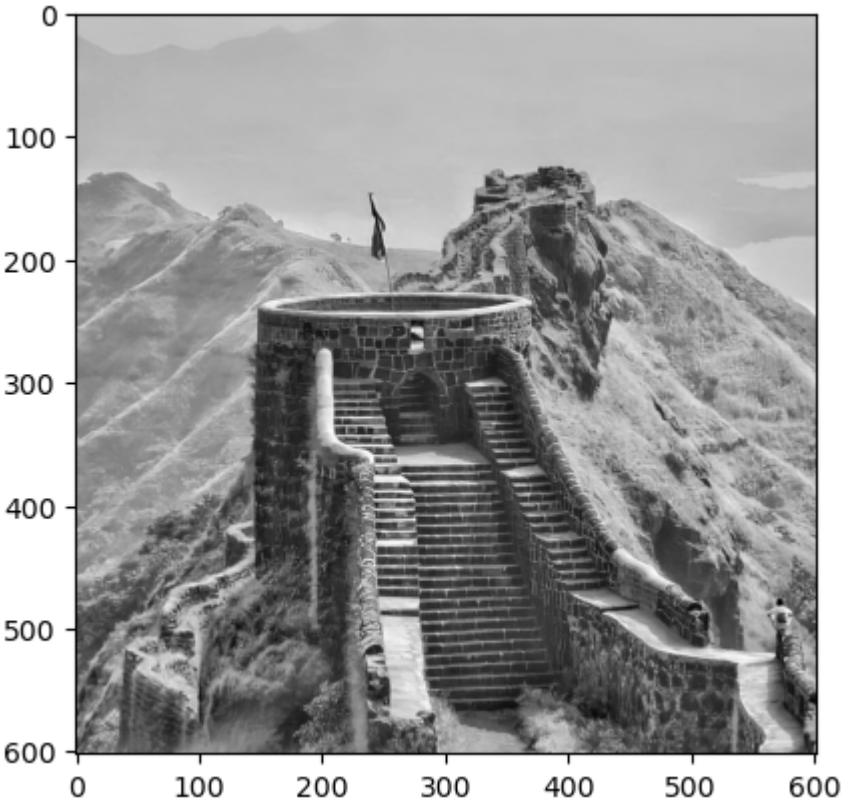
In [31]:
```
plt.imshow(fort_copy[:,:,0], cmap='gray')
```

Out[31]: <matplotlib.image.AxesImage at 0x22fbd6d4550>



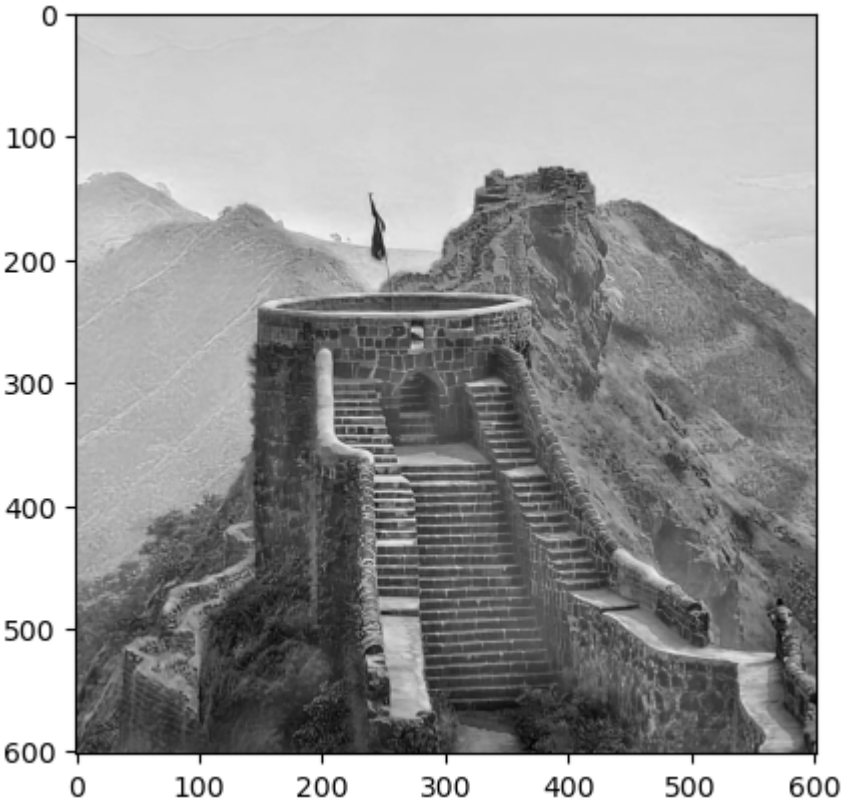
In [32]:
```
plt.imshow(fort_copy[:,:,1], cmap='gray')
```

Out[32]: <matplotlib.image.AxesImage at 0x22fbd718dd0>



In [33]:
```
plt.imshow(fort_copy[:,:,2], cmap='gray')
```

Out[33]: <matplotlib.image.AxesImage at 0x22fbd7bc1d0>



In [34]:
```
fort_copy[:,:,0]
```

Out[34]:
```
array([[162, 163, 163, ..., 167, 165, 165],
       [161, 163, 162, ..., 165, 165, 165],
       [161, 161, 161, ..., 164, 165, 165],
       ...,
       [ 64, 104, 149, ...,  55, 128, 183],
       [ 75, 124, 124, ...,  69, 141, 157],
       [ 91, 115, 122, ...,  92, 134, 133]], dtype=uint8)
```

In [35]:
```
fort_copy[:,:,1]
```

Out[35]:
```
array([[199, 197, 197, ..., 197, 195, 195],
       [198, 197, 196, ..., 195, 195, 195],
       [195, 195, 195, ..., 194, 195, 195],
       ...,
       [ 73, 113, 159, ...,  47, 120, 172],
       [ 84, 134, 136, ...,  59, 130, 142],
       [103, 128, 135, ...,  80, 121, 118]], dtype=uint8)
```

In [36]:
```
fort_copy[:,:,2]
```

Out[36]:
```
array([[207, 206, 206, ..., 205, 203, 203],
       [207, 207, 206, ..., 203, 203, 203],
       [205, 205, 205, ..., 202, 203, 203],
       ...,
       [ 52,  92, 135, ...,  34, 101, 150],
       [ 63, 110, 112, ...,  47, 112, 121],
       [ 79, 102, 109, ...,  68, 105,  97]], dtype=uint8)
```

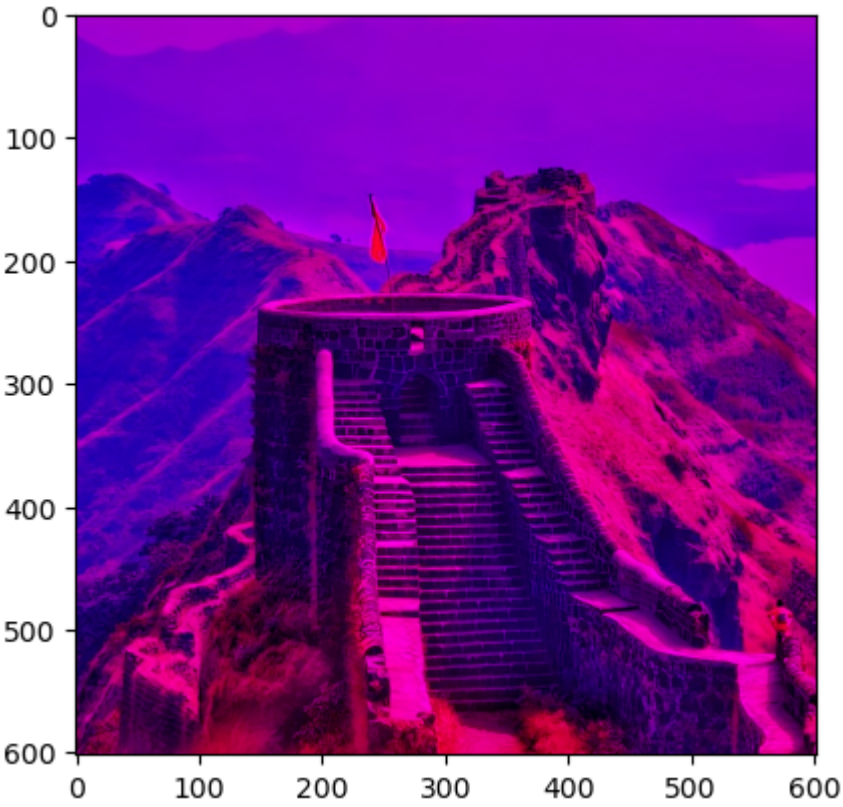
In [37]:
```
fort_copy[:,:,1] = 0
```

In [38]:
```
fort_copy[:,:,1]
```

Out[38]:
```
array([[0, 0, 0, ..., 0, 0, 0],
       [0, 0, 0, ..., 0, 0, 0],
       [0, 0, 0, ..., 0, 0, 0],
       ...,
       [0, 0, 0, ..., 0, 0, 0],
       [0, 0, 0, ..., 0, 0, 0],
       [0, 0, 0, ..., 0, 0, 0]], dtype=uint8)
```

In [39]:
```
plt.imshow(fort_copy)
```

Out[39]:
```
<matplotlib.image.AxesImage at 0x22fbd834dd0>
```



In [40]:
```
fort_copy[:,:,2]
```

Out[40]:
```
array([[207, 206, 206, ..., 205, 203, 203],
       [207, 207, 206, ..., 203, 203, 203],
       [205, 205, 205, ..., 202, 203, 203],
       ...,
       [ 52,  92, 135, ...,  34, 101, 150],
       [ 63, 110, 112, ...,  47, 112, 121],
       [ 79, 102, 109, ...,  68, 105,  97]], dtype=uint8)
```

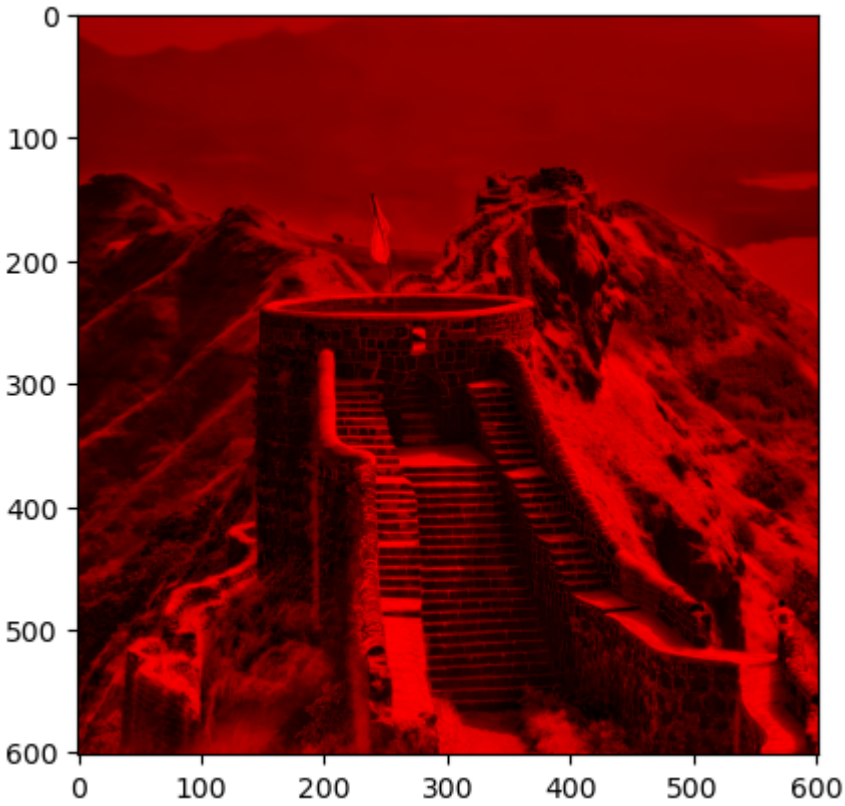
In [41]:
```
fort_copy[:,:,2] = 0
```

In [42]:
```
fort_copy[:,:,2]
```

Out[42]:
```
array([[0, 0, 0, ..., 0, 0, 0],
       [0, 0, 0, ..., 0, 0, 0],
       [0, 0, 0, ..., 0, 0, 0],
       ...,
       [0, 0, 0, ..., 0, 0, 0],
       [0, 0, 0, ..., 0, 0, 0],
       [0, 0, 0, ..., 0, 0, 0]], dtype=uint8)
```

In [43]:
```
plt.imshow(fort_copy)
```

Out[43]:
```
<matplotlib.image.AxesImage at 0x22fbe9b51d0>
```



In [44]:
```
fort_img
```

Out[44]:
```
array([[[162, 199, 207],
        [163, 197, 206],
        [163, 197, 206],
        ...,
        [167, 197, 205],
        [165, 195, 203],
        [165, 195, 203]],

       [[161, 198, 207],
        [163, 197, 207],
        [162, 196, 206],
        ...,
        [165, 195, 203],
        [165, 195, 203],
        [165, 195, 203]],

       [[161, 195, 205],
        [161, 195, 205],
        [161, 195, 205],
        ...,
        [164, 194, 202],
        [165, 195, 203],
        [165, 195, 203]],

       ...,

       [[ 64,  73,  52],
        [104, 113,  92],
        [149, 159, 135],
        ...,
        [ 55,  47,  34],
        [128, 120, 101],
        [183, 172, 150]],

       [[ 75,  84,  63],
        [124, 134, 110],
        [124, 136, 112],
        ...,
        [ 69,  59,  47],
        [141, 130, 112],
        [157, 142, 121]],

       [[ 91, 103,  79],
        [115, 128, 102],
        [122, 135, 109],
        ...,
        [ 92,  80,  68],
        [134, 121, 105],
        [133, 118,  97]]], dtype=uint8)
```

In [45]:
```
fort_copy
```

Out[45]:
```
array([[[162,   0,   0],
        [163,   0,   0],
        [163,   0,   0],
        ...,
        [167,   0,   0],
        [165,   0,   0],
        [165,   0,   0]],

       [[161,   0,   0],
        [163,   0,   0],
        [162,   0,   0],
        ...,
        [165,   0,   0],
        [165,   0,   0],
        [165,   0,   0]],

       [[161,   0,   0],
        [161,   0,   0],
        [161,   0,   0],
        ...,
        [164,   0,   0],
        [165,   0,   0],
        [165,   0,   0]],

       ...,

       [[ 64,   0,   0],
        [104,   0,   0],
        [149,   0,   0],
        ...,
        [ 55,   0,   0],
        [128,   0,   0],
        [183,   0,   0]],

       [[ 75,   0,   0],
        [124,   0,   0],
        [124,   0,   0],
        ...,
        [ 69,   0,   0],
        [141,   0,   0],
        [157,   0,   0]],

       [[ 91,   0,   0],
        [115,   0,   0],
        [122,   0,   0],
        ...,
        [ 92,   0,   0],
        [134,   0,   0],
        [133,   0,   0]]], dtype=uint8)
```

In [57]:
```
arr1 = np.asarray(fort_img)
```

In [58]:
```
arr1
```

Out[58]:
```
array([[[162, 199, 207],
        [163, 197, 206],
        [163, 197, 206],
        ...,
        [167, 197, 205],
        [165, 195, 203],
        [165, 195, 203]],

       [[161, 198, 207],
        [163, 197, 207],
        [162, 196, 206],
        ...,
        [165, 195, 203],
        [165, 195, 203],
        [165, 195, 203]],

       [[161, 195, 205],
        [161, 195, 205],
        [161, 195, 205],
        ...,
        [164, 194, 202],
        [165, 195, 203],
        [165, 195, 203]],

       ...,

       [[ 64,  73,  52],
        [104, 113,  92],
        [149, 159, 135],
        ...,
        [ 55,  47,  34],
        [128, 120, 101],
        [183, 172, 150]],

       [[ 75,  84,  63],
        [124, 134, 110],
        [124, 136, 112],
        ...,
        [ 69,  59,  47],
        [141, 130, 112],
        [157, 142, 121]],

       [[ 91, 103,  79],
        [115, 128, 102],
        [122, 135, 109],
        ...,
        [ 92,  80,  68],
        [134, 121, 105],
        [133, 118,  97]]], dtype=uint8)
```

In [59]:
```
type(arr1)
```

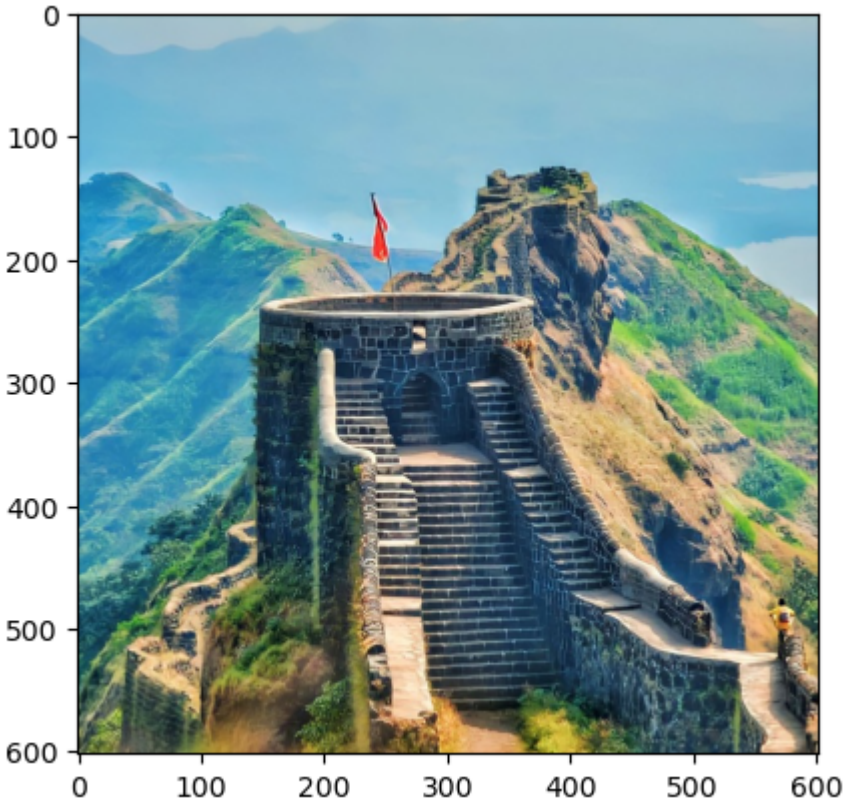
Out[59]:
```
numpy.ndarray
```

In [60]:
```
arr1.shape
```

Out[60]:
```
(602, 602, 3)
```

In [61]:
```
plt.imshow(arr1)
```

Out[61]: <matplotlib.image.AxesImage at 0x22fc004b090>



In [62]:
```
fort_img2 = arr1.copy()
```

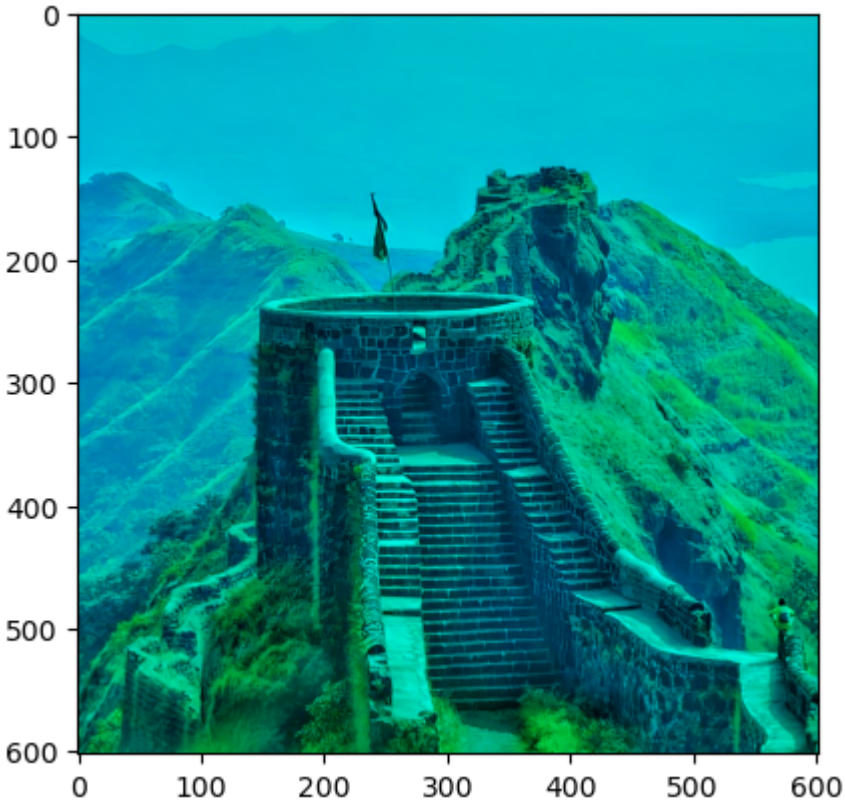
In [63]:
```
fort_img2[:,:,0] = 0
```

In [64]:
```
fort_img2
```

Out[64]:
```
array([[[  0, 199, 207],
        [  0, 197, 206],
        [  0, 197, 206],
        ...,
        [  0, 197, 205],
        [  0, 195, 203],
        [  0, 195, 203]],

       [[  0, 198, 207],
        [  0, 197, 207],
        [  0, 196, 206],
        ...,
        [  0, 195, 203],
        [  0, 195, 203],
        [  0, 195, 203]],

       [[  0, 195, 205],
        [  0, 195, 205],
        [  0, 195, 205],
        ...,
        [  0, 194, 202],
        [  0, 195, 203],
        [  0, 195, 203]],

       ...,

       [[  0,  73,  52],
        [  0, 113,  92],
        [  0, 159, 135],
        ...,
        [  0,  47,  34],
        [  0, 120, 101],
        [  0, 172, 150]],

       [[  0,  84,  63],
        [  0, 134, 110],
        [  0, 136, 112],
        ...,
        [  0,  59,  47],
        [  0, 130, 112],
        [  0, 142, 121]],

       [[  0, 103,  79],
        [  0, 128, 102],
        [  0, 135, 109],
        ...,
        [  0,  80,  68],
        [  0, 121, 105],
        [  0, 118,  97]]], dtype=uint8)
```

In [65]:
```
plt.imshow(fort_img2)
```

Out[65]:
```
<matplotlib.image.AxesImage at 0x22fbffa3890>
```



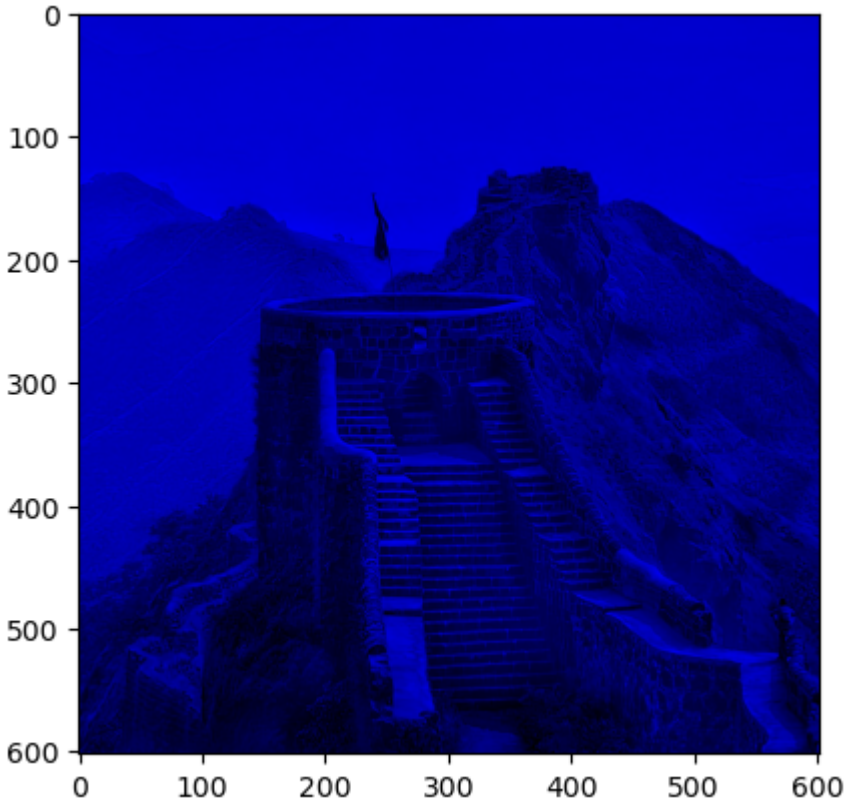
In [66]:
```
fort_img2[:,:,1]
```

Out[66]:
```
array([[199, 197, 197, ..., 197, 195, 195],
       [198, 197, 196, ..., 195, 195, 195],
       [195, 195, 195, ..., 194, 195, 195],
       ...,
       [ 73, 113, 159, ...,  47, 120, 172],
       [ 84, 134, 136, ...,  59, 130, 142],
       [103, 128, 135, ...,  80, 121, 118]], dtype=uint8)
```

In [67]:
```
fort_img2[:,:,1]=0
```

In [69]:
```
plt.imshow(fort_img2)
```

Out[69]:
```
<matplotlib.image.AxesImage at 0x22fc2b884d0>
```


0
100
200
300
400
500
600
0
100
200
300
400
500
600