

# GENEHMIGT

Yi Wei 3371480

motor : 3500 steps/s  
motor : 1 step = 1.8°

⇒ motor : 6300°/s = 17.5 rounds/s  
52 motor = 1 stage

stage :  
⇒ 35/104 rounds/s

$$\left. \begin{array}{l} \text{stage: } 32 \text{ bars} \\ \text{stage: } \frac{31}{104} \text{ mm/s} \end{array} \right] \Rightarrow \text{stage: } \frac{140}{13} \text{ bars/s}$$

$$f_{Ny} = 2 \cdot f_s = \frac{280}{13} \text{ Hz}$$

maximum sampling frequency (stand still)  $\frac{140}{13}$

$f_{\max} = \frac{1}{N} \cdot f_s = \frac{1}{N} \cdot \frac{140}{13} \text{ /s. (NEEN)} \Rightarrow f_{\max} = \frac{140}{13} \text{ /s}$  ✓

$0 \leq f \leq 30 \text{ Hz}$

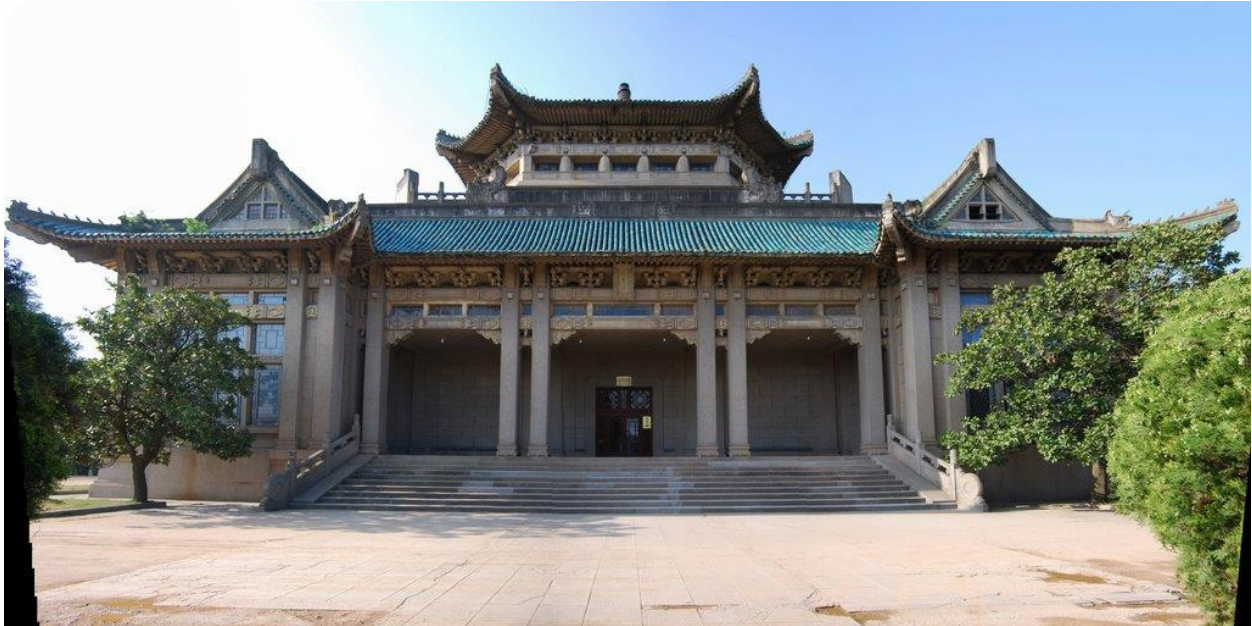
$$[3, 5]_{(H_2)} \Rightarrow \left[\frac{1}{5}, \frac{1}{3}\right]_{(S)}$$

$$\text{stage} = \frac{140}{13} \text{ b/s} \Rightarrow \frac{13}{140} \text{ s/b} \Rightarrow \frac{39}{140} \text{ s} \in [\frac{1}{f}, \frac{1}{s}]$$

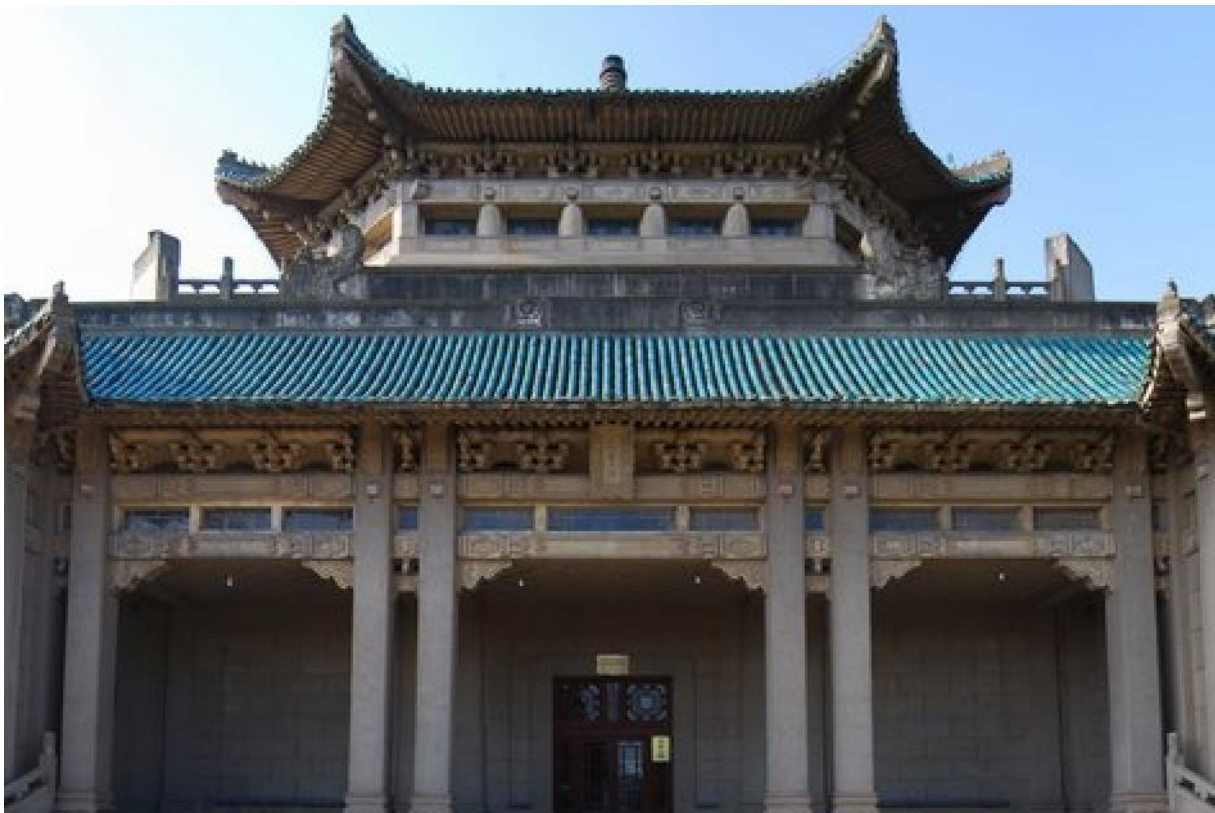
$$\Rightarrow \left[ \frac{39-15}{140}, \frac{39}{140} \right] \cup \left[ \frac{52-65}{140}, \frac{52}{140} \right] \Rightarrow \left( \frac{13}{56}, \frac{39}{140} \right) \cup \left( \frac{91}{280}, \frac{1}{3} \right) \leq$$

2. Select any kind of (digital) image, which contains much of (small, repetitive) information. Resize this image on your computer screen by just using zoom-in, zoom-out functions. Carefully look, if and when aliasing happens. Please discuss. Document via screen-shots.

1) original image



2) zoom in (200%)



Obviously there is no aliasing

2) zoom out

50%



Aliasing appears on the roof area, with the stripes bending.

36%



Aliasing seems even more conspicuous, with the direction of the stripes even inverting.

Discussion:

According to the sampling theorem, the Nyquist frequency should be smaller than double sampling rate.

- In terms of zooming in, the sampling rate increases, thus it absolutely fulfills the condition.
- In terms of zooming out, the sampling rate decreases, and when it decreases to half of the Nyquist frequency, the frequency function starts to overlap, and aliasing begins.

