TP2 : Restauration d'images

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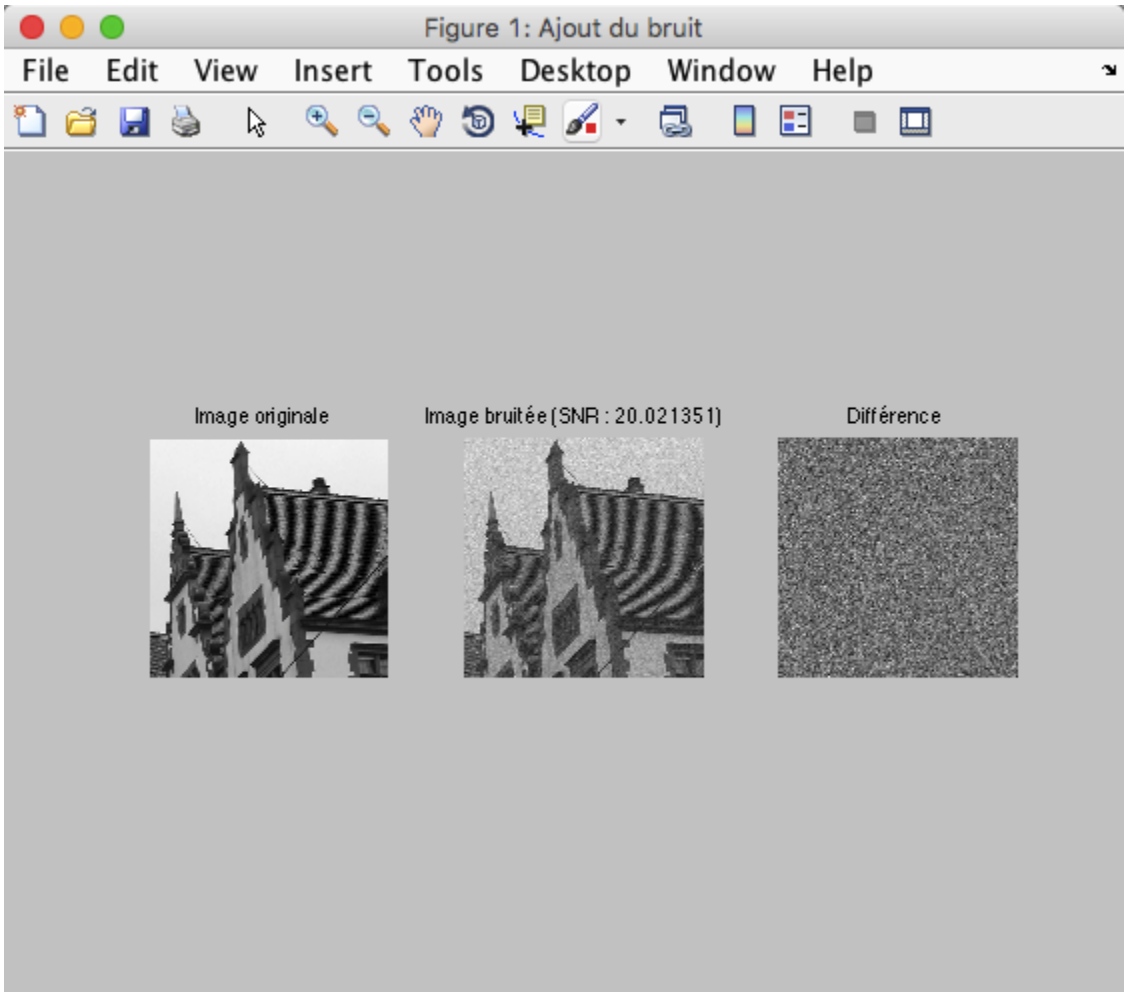
2) Déconvolution d'images 5

1) Débruitage d'images



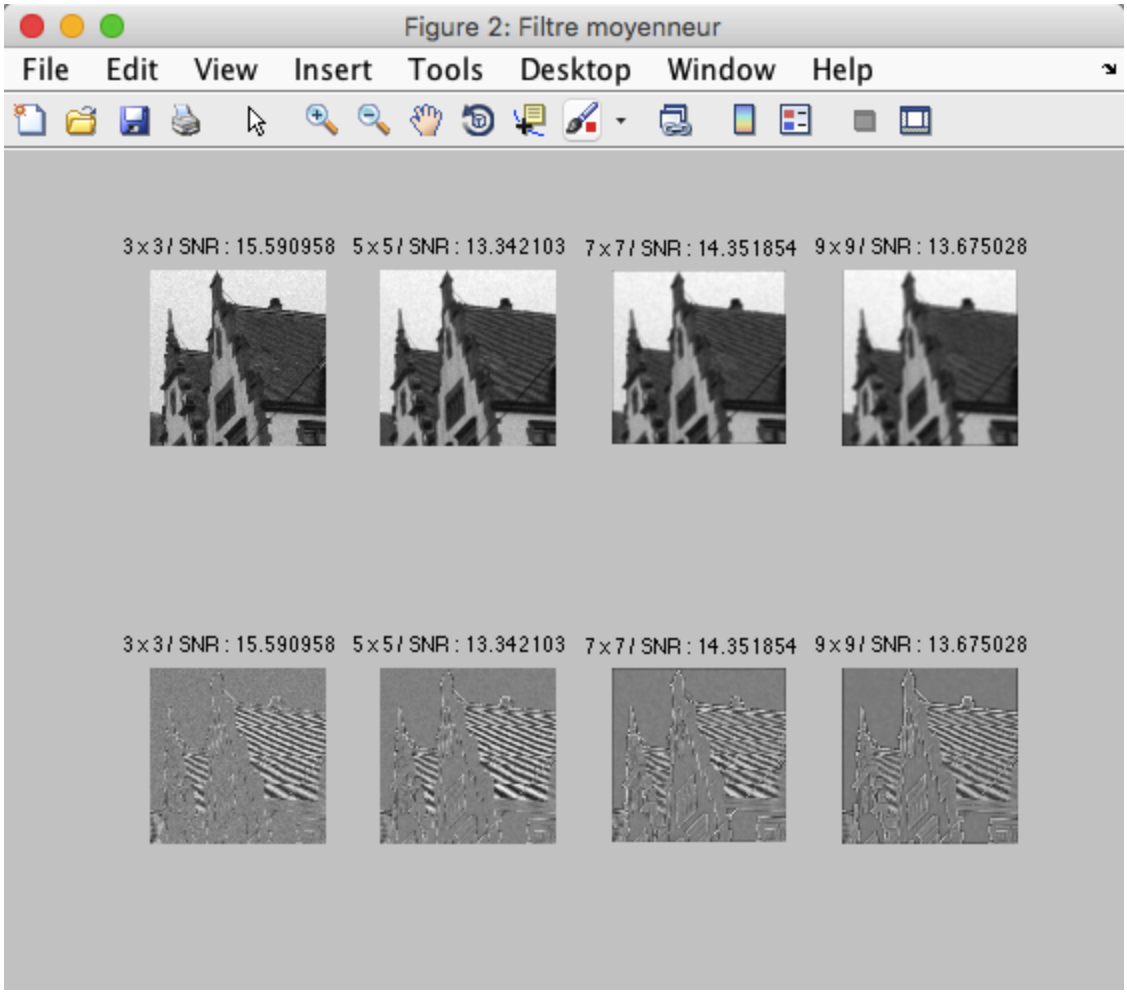


Figure 2: Filtre moyenneur
File Edit View Insert Tools Desktop Window Help
3x3 / SNR : 15.590958
5x5 / SNR : 13.342103
7x7 / SNR : 14.351854
9x9 / SNR : 13.675028
3x3 / SNR : 15.590958
5x5 / SNR : 13.342103
7x7 / SNR : 14.351854
9x9 / SNR : 13.675028

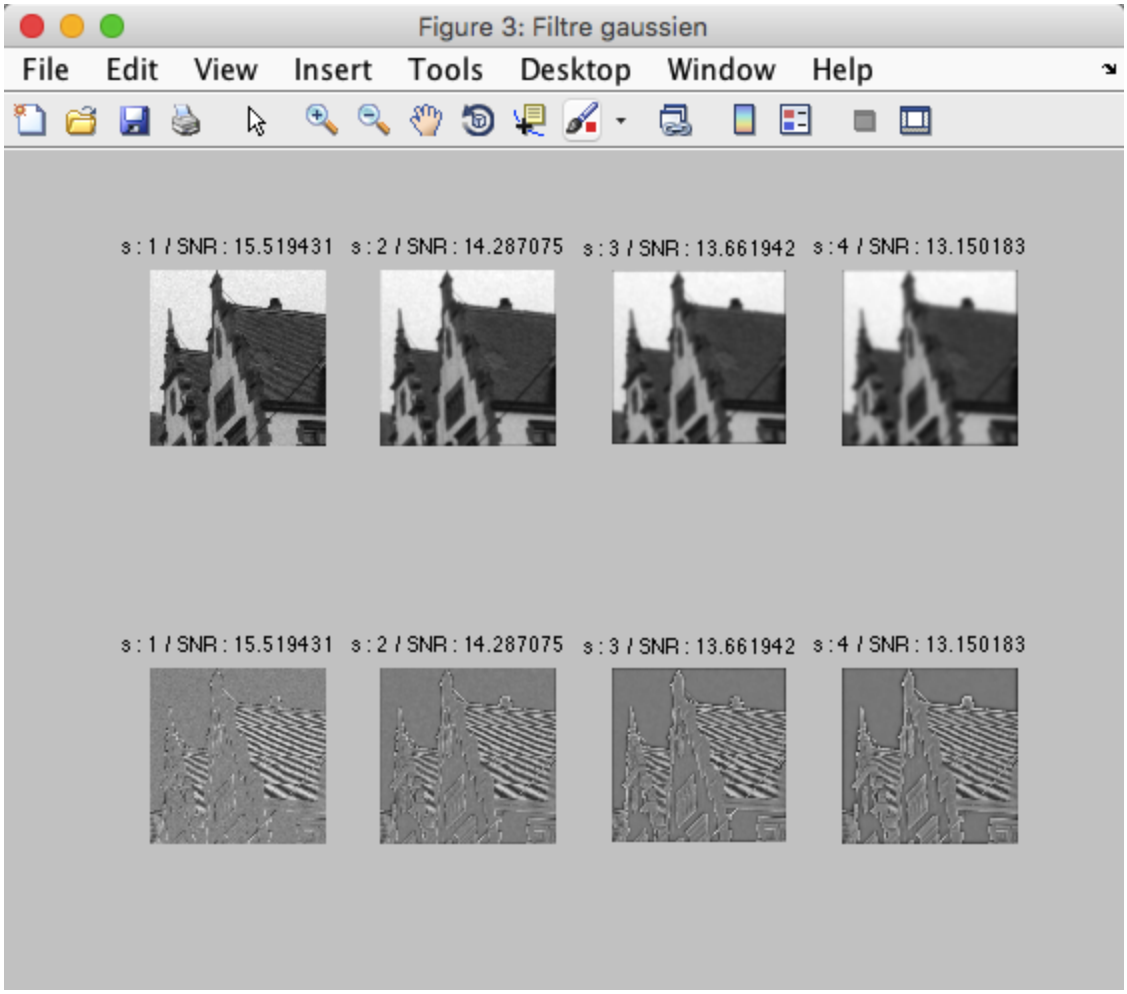


Figure 3: Filtre gaussien
File Edit View Insert Tools Desktop Window Help
s : 1 / SNR : 15.519431
s : 2 / SNR : 14.287075
s : 3 / SNR : 13.661942
s : 4 / SNR : 13.150183
s : 1 / SNR : 15.519431
s : 2 / SNR : 14.287075
s : 3 / SNR : 13.661942
s : 4 / SNR : 13.150183

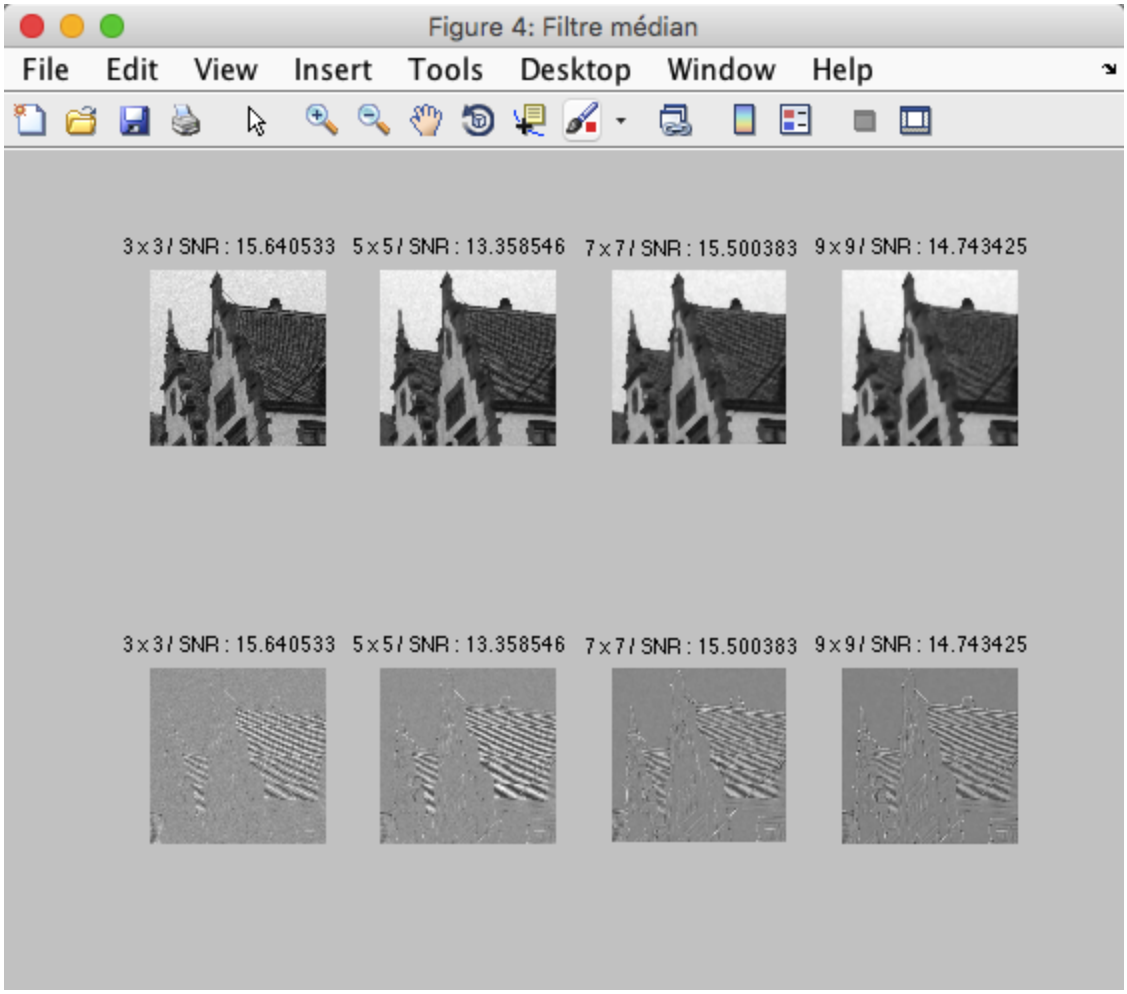
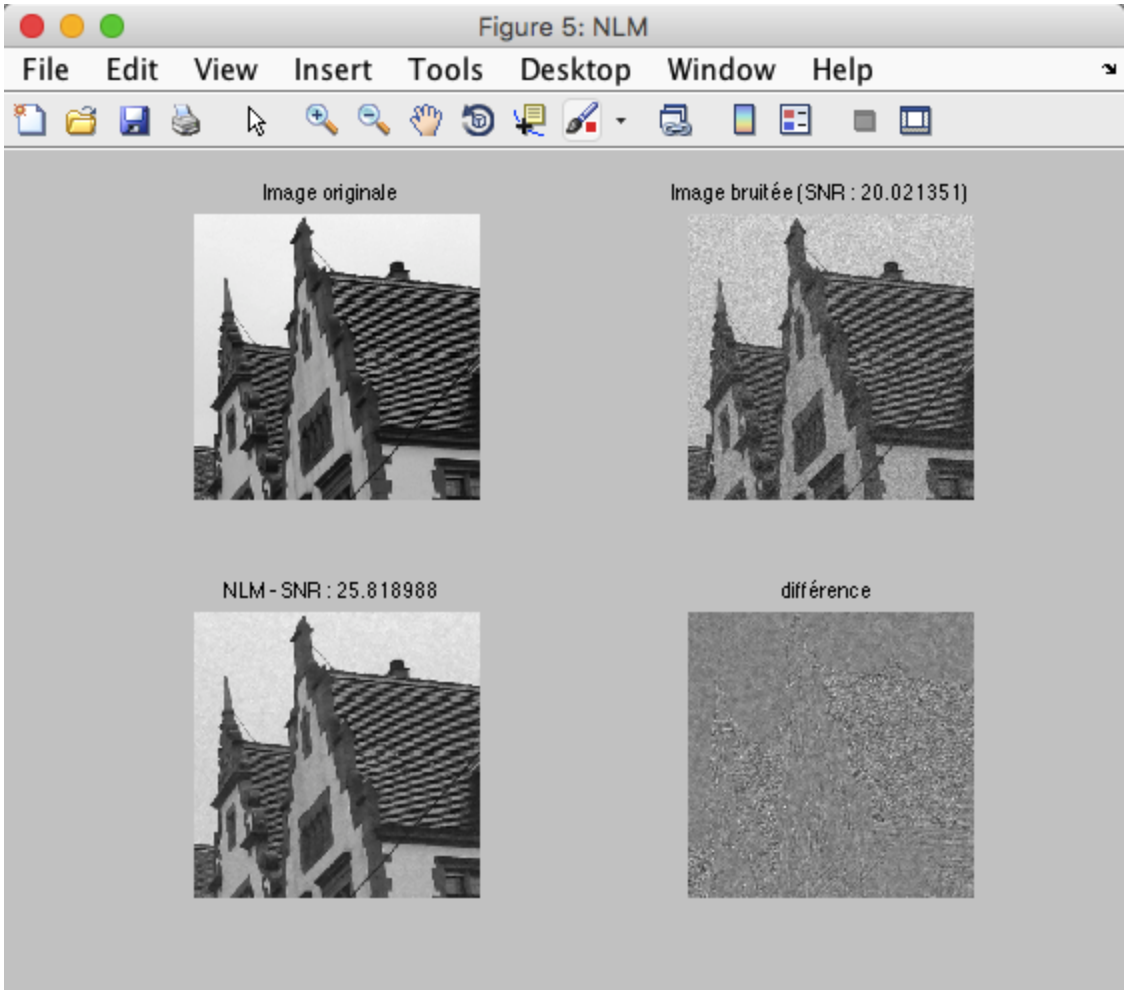


Figure 4: Filtre médian
File Edit View Insert Tools Desktop Window Help
3x3 / SNR : 15.640533
5x5 / SNR : 13.358546
7x7 / SNR : 15.500383
9x9 / SNR : 14.743425
3x3 / SNR : 15.640533
5x5 / SNR : 13.358546
7x7 / SNR : 15.500383
9x9 / SNR : 14.743425



A retenir :

- Filtrage moyenneur et gaussien : simple, rapide, mais lisse les contours (image résultat floue)
- Filtre médian : préserve mieux les contours, mais apparition d'un effet cartoon (ie, image constante par morceaux)
- Algorithme des moyennes non locales : de loin le plus performant, mais beaucoup plus coûteux en temps de calcul

2) Déconvolution d'images

Avec l'option 'circular'

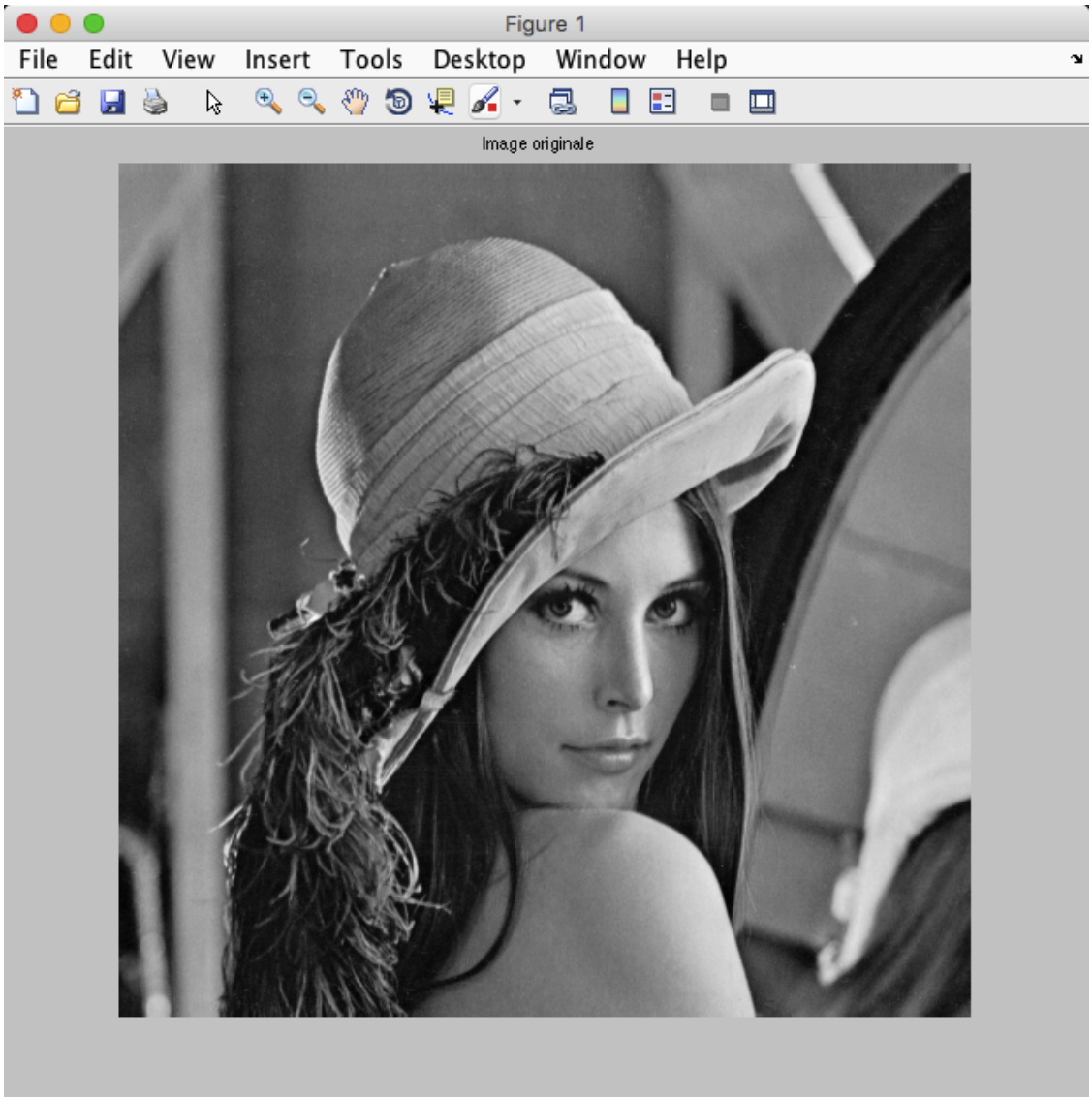


Figure 1
File Edit View Insert Tools Desktop Window Help
Image originale

Figure 2
Noyau de convolution (PSF)

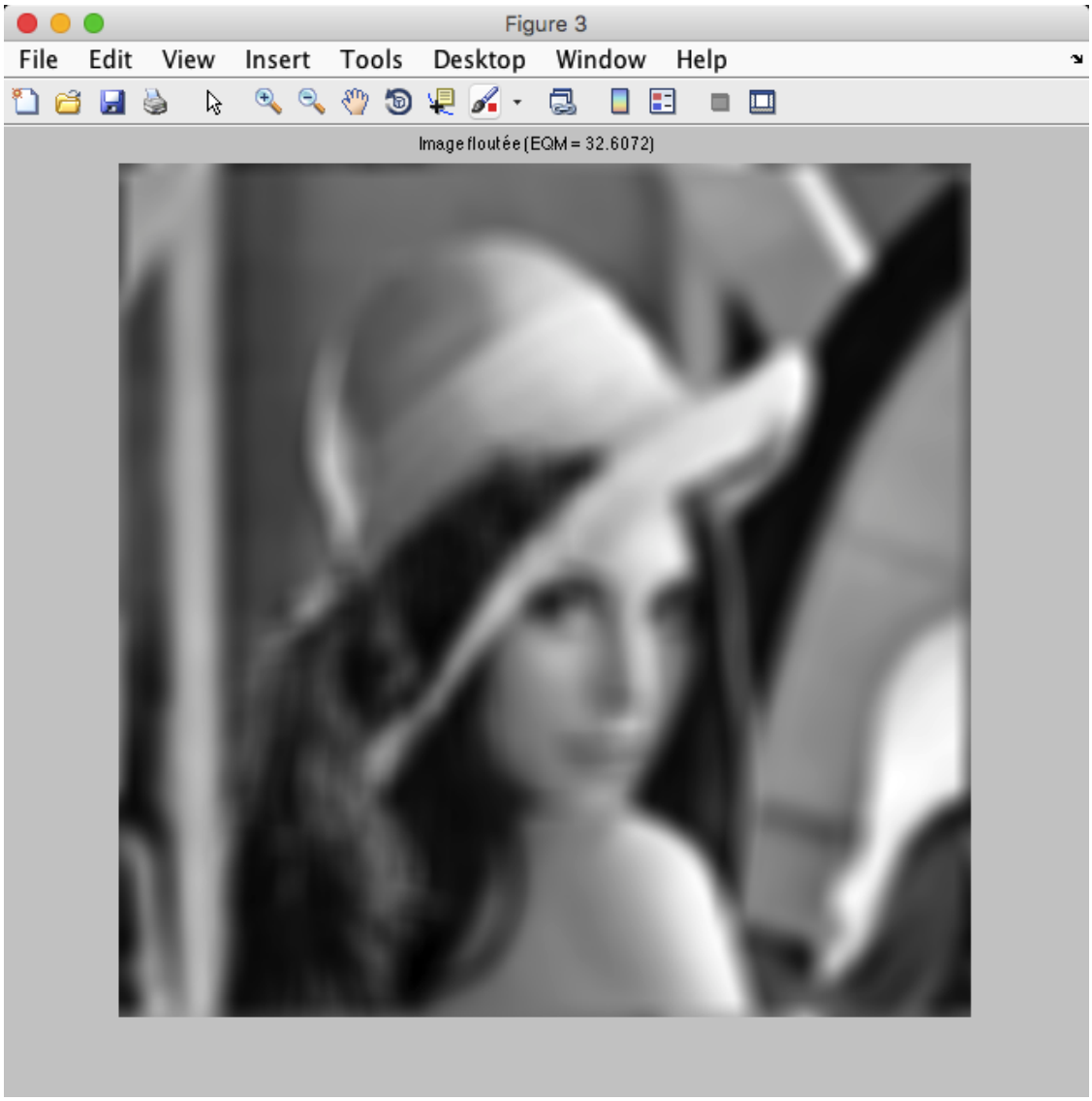


Figure 3
File Edit View Insert Tools Desktop Window Help
Image floutée (EQM = 32.6072)

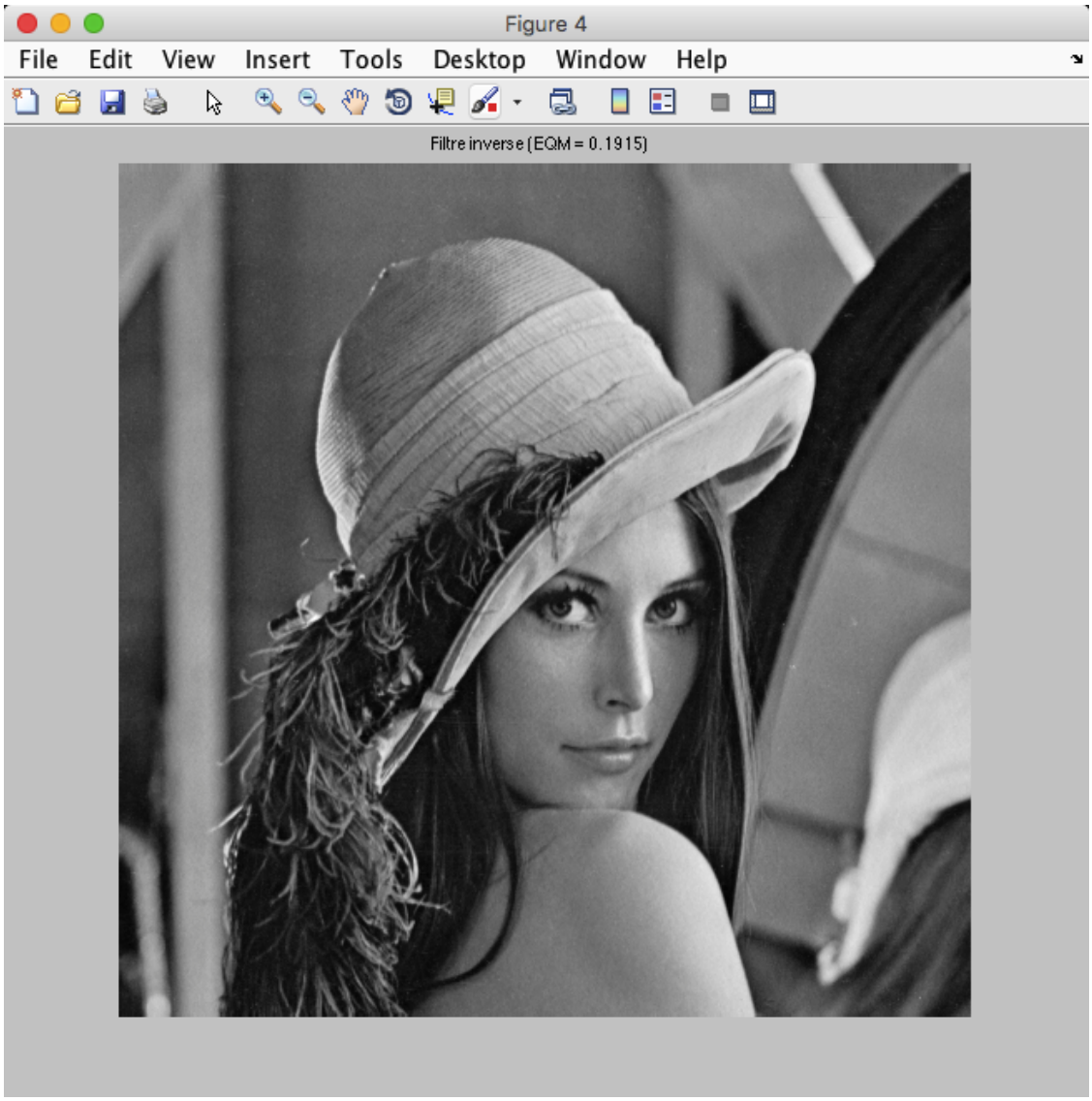


Figure 4
File Edit View Insert Tools Desktop Window Help
Filtre inverse (EQM = 0.1915)

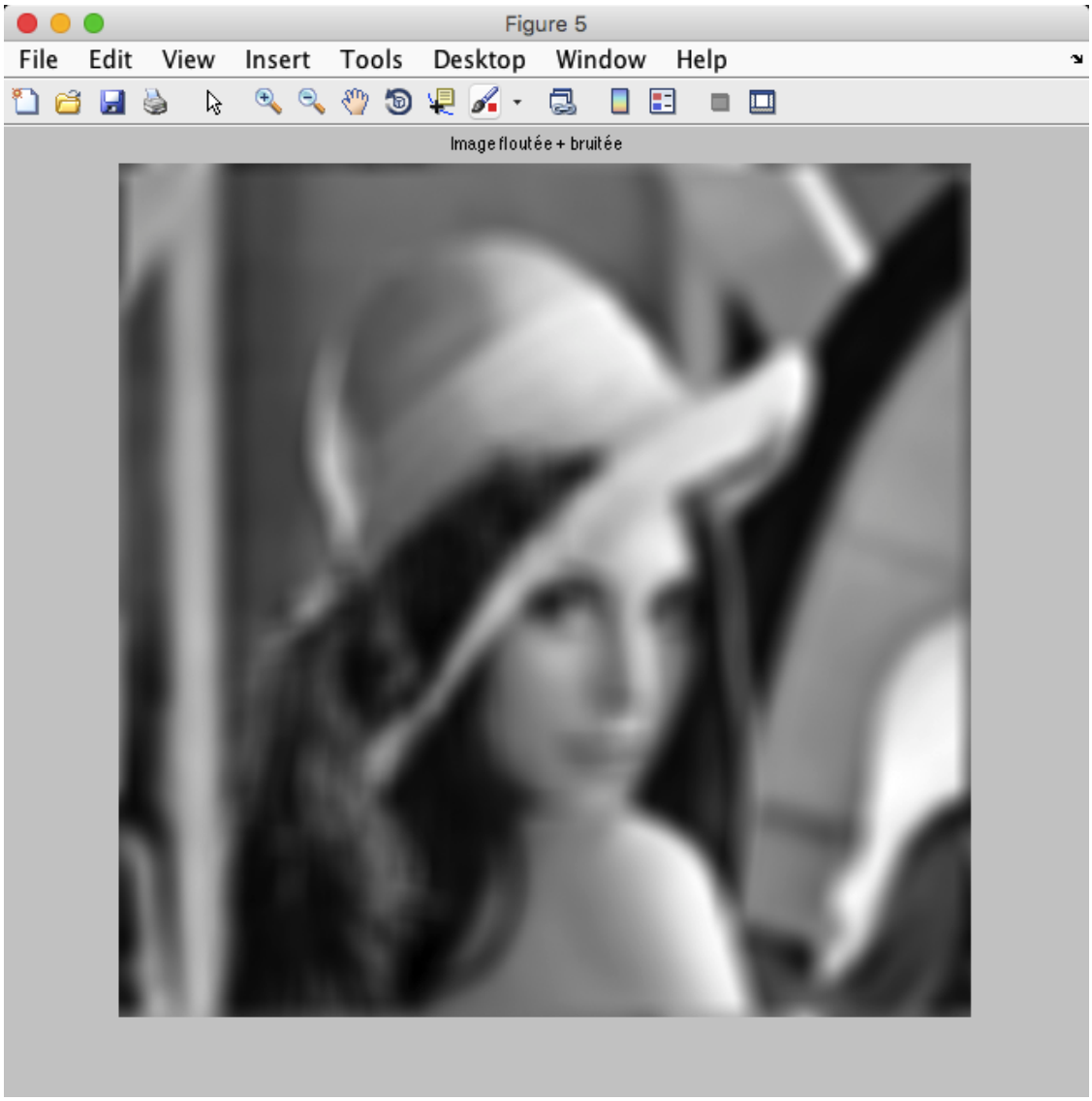


Figure 5
File Edit View Insert Tools Desktop Window Help
Image floutée + bruitée

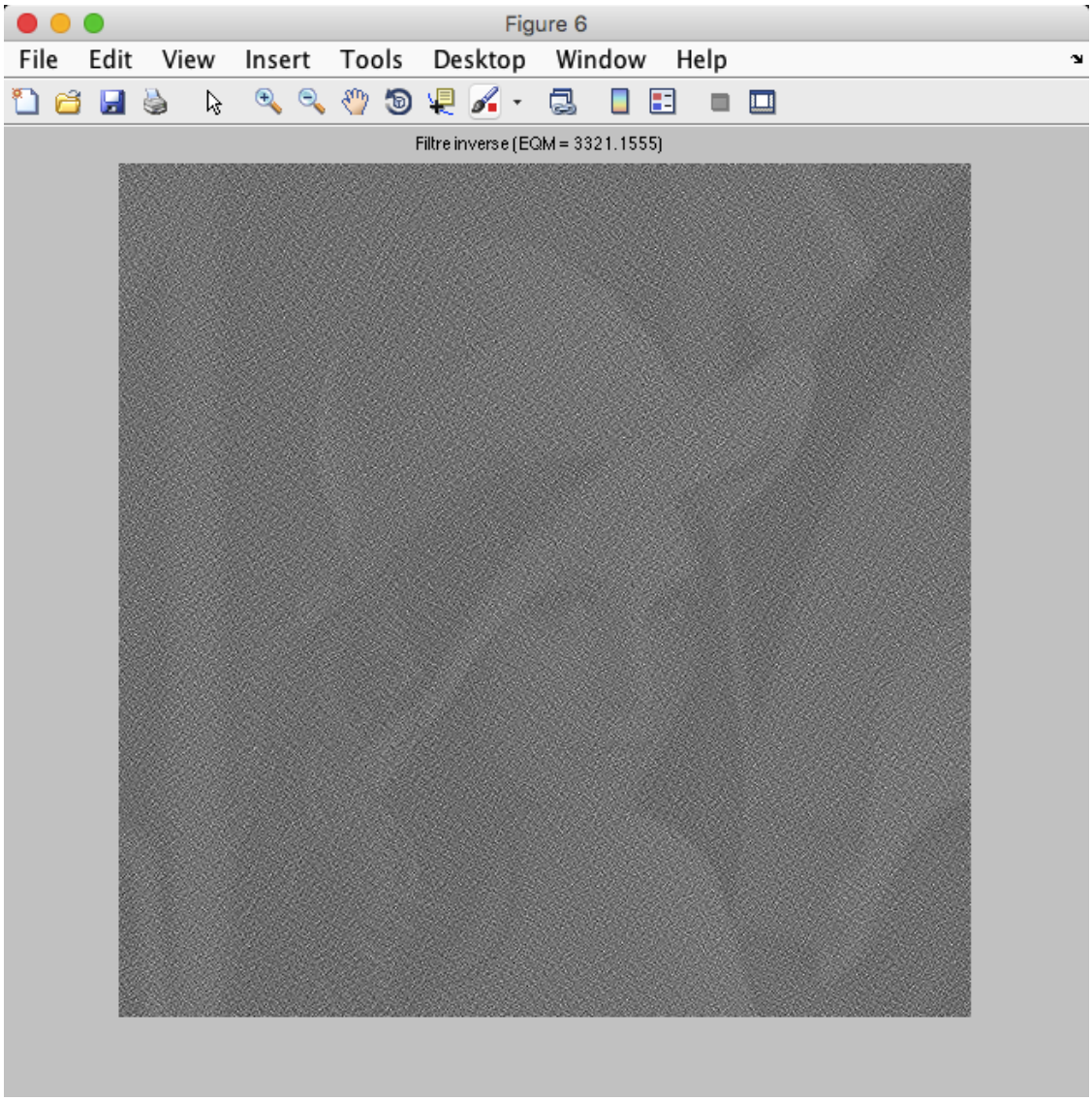


Figure 6
File Edit View Insert Tools Desktop Window Help
Filtre inverse (EQM = 3321.1555)

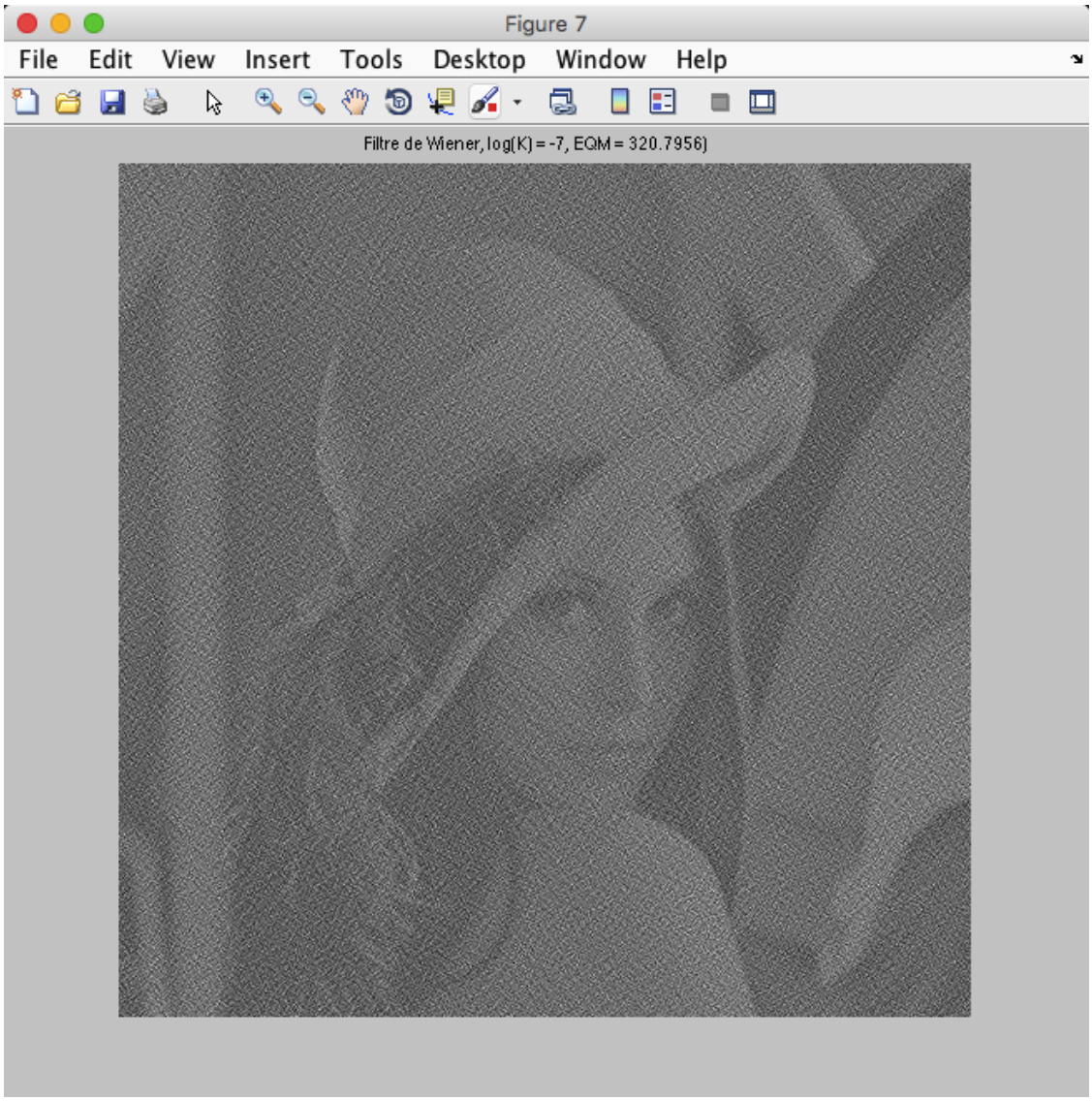


Figure 7
File Edit View Insert Tools Desktop Window Help
Filtre de Wiener, log(K) = -7, EQM = 320.7956)

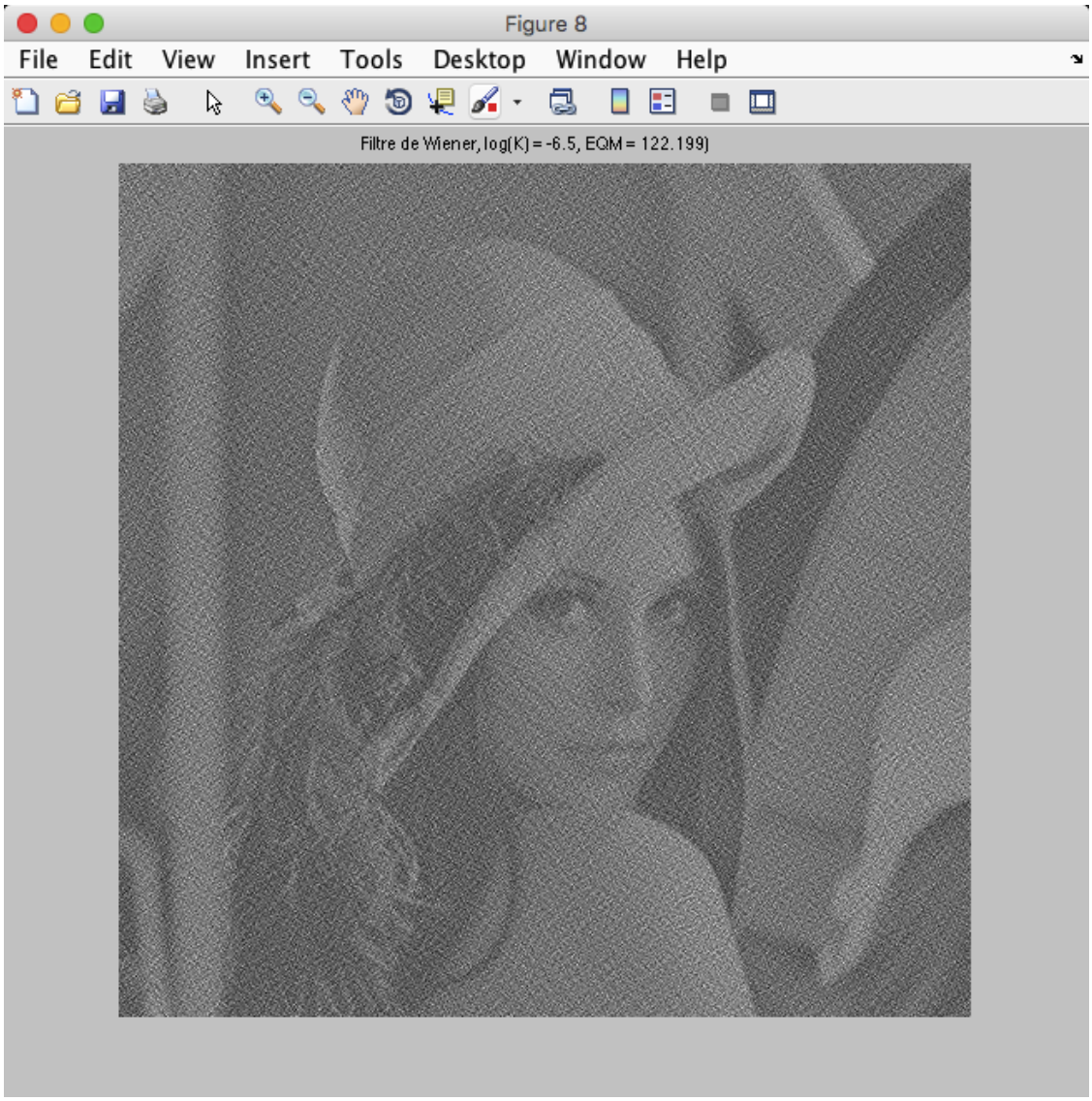


Figure 8
File Edit View Insert Tools Desktop Window Help
Filtre de Wiener, log(K) = -6.5, EQM = 122.199)

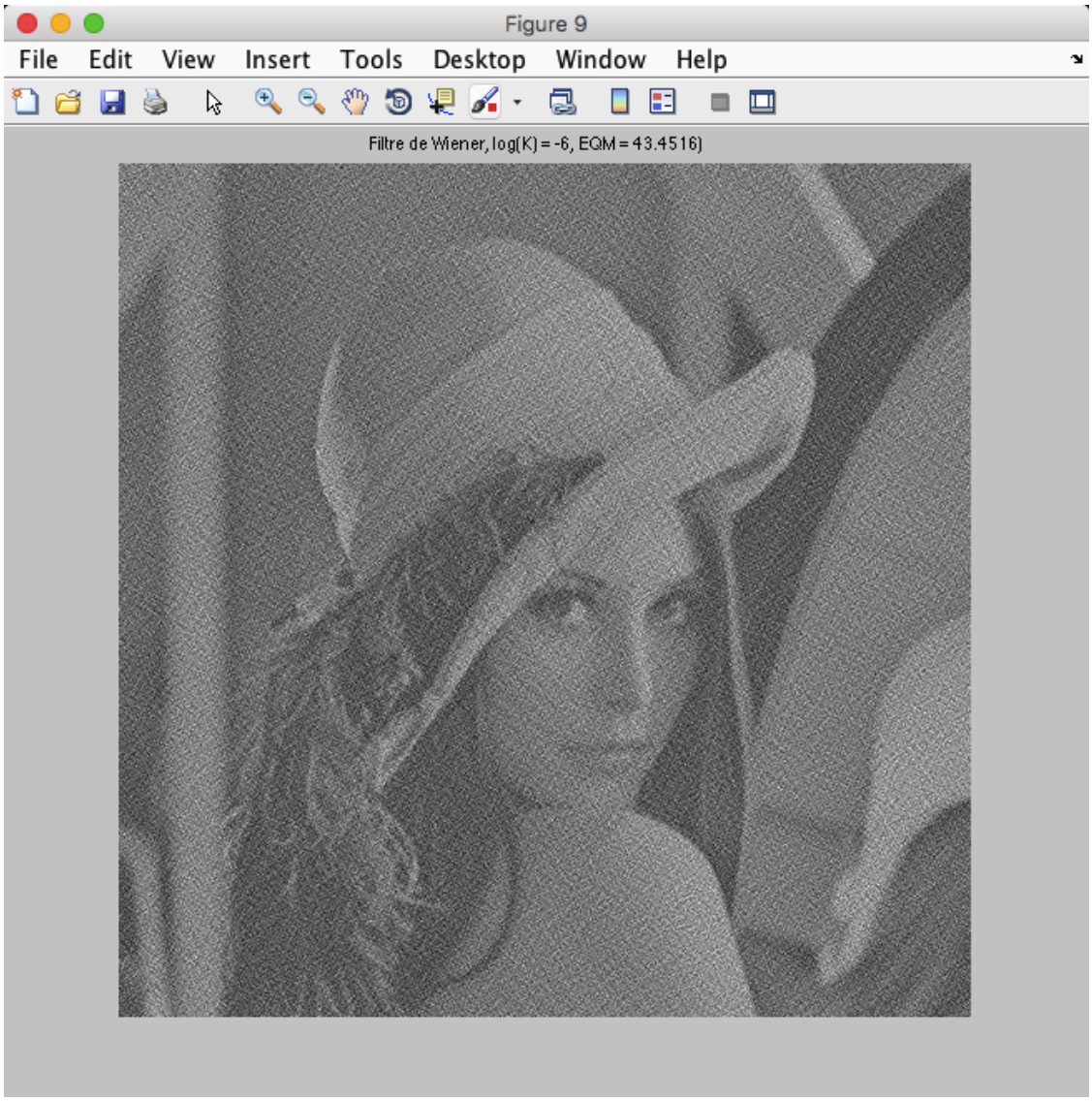


Figure 9
File Edit View Insert Tools Desktop Window Help
Filtre de Wiener, log(K) = -6, EQM = 43.4516

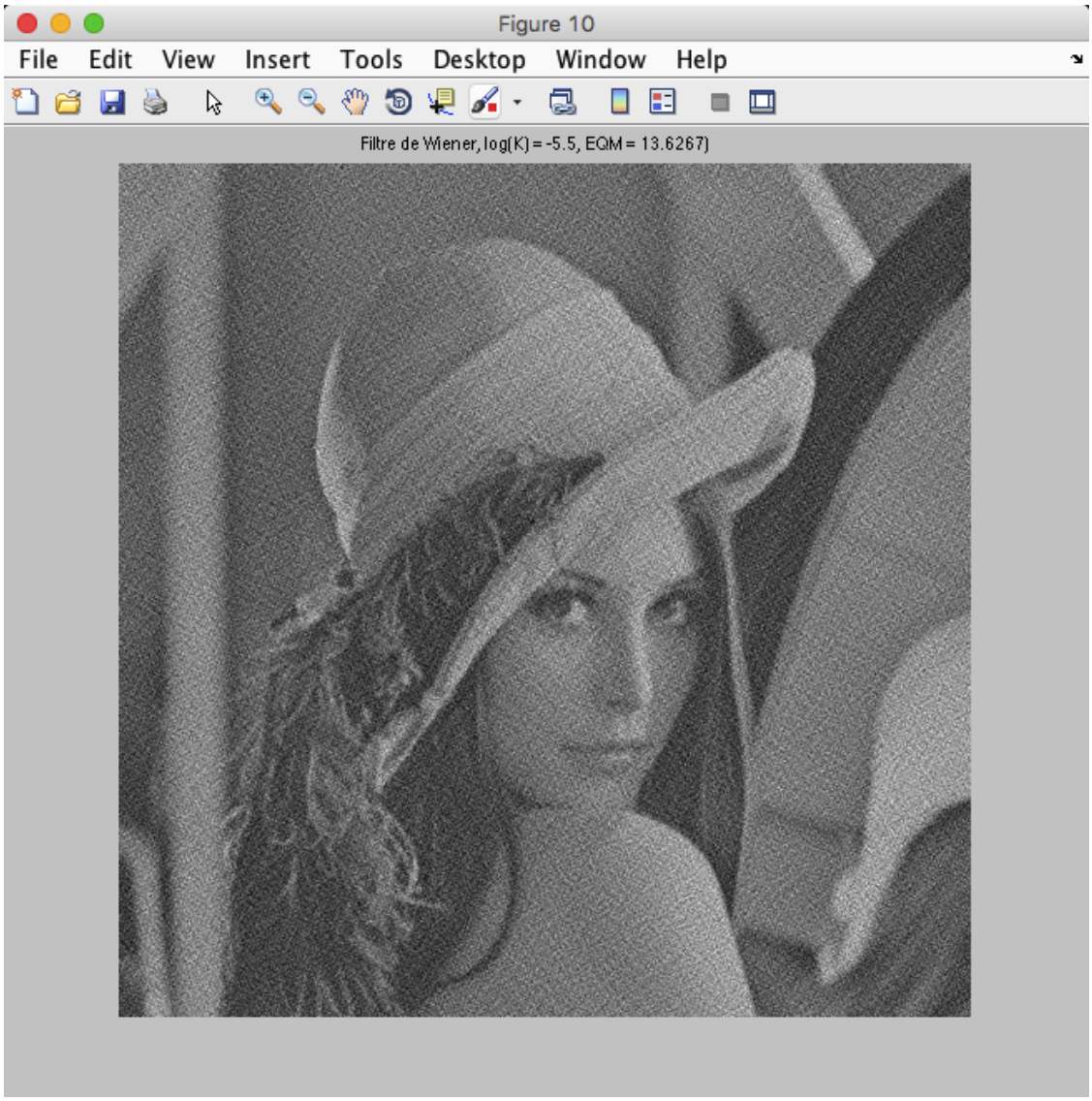


Figure 10
File Edit View Insert Tools Desktop Window Help
Filtre de Wiener, log(K) = -5.5, EQM = 13.6267)

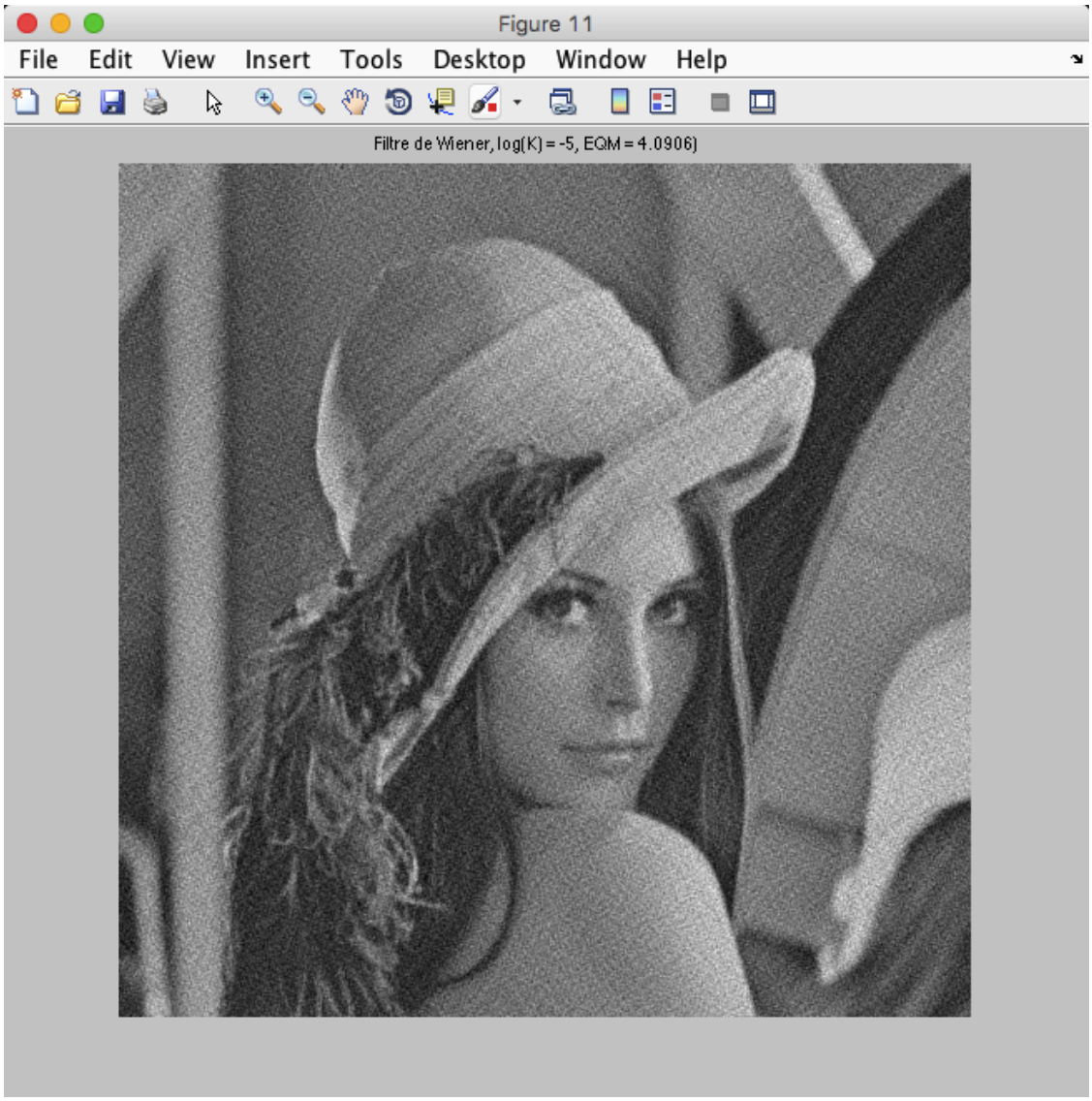


Figure 11
File Edit View Insert Tools Desktop Window Help
Filtre de Wiener, log(K) = -5, EQM = 4.0906)

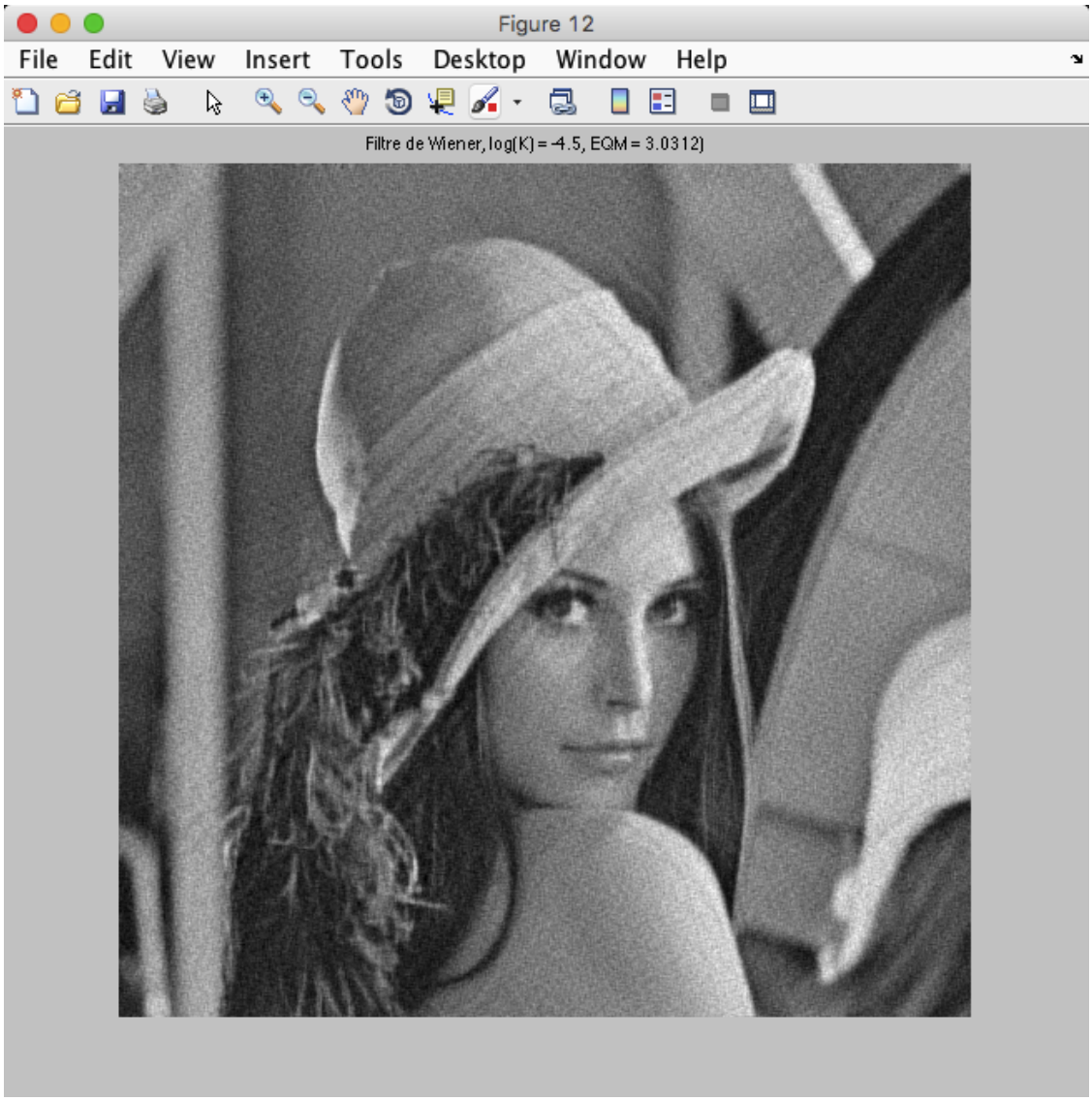


Figure 12
File Edit View Insert Tools Desktop Window Help
Filtre de Wiener, log(K) = -4.5, EQM = 3.0312)

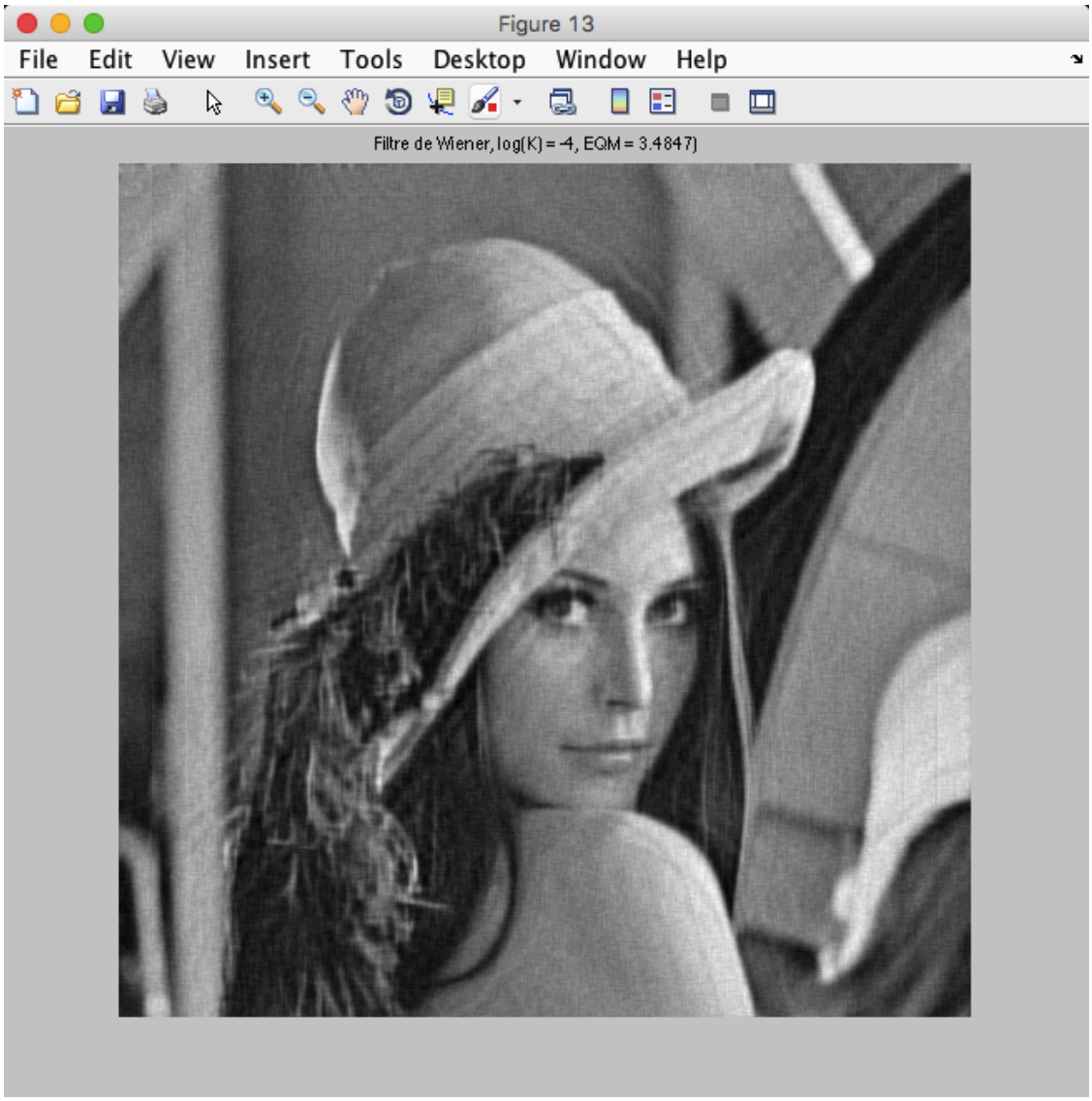


Figure 13
File Edit View Insert Tools Desktop Window Help
Filtre de Wiener, log(K) = -4, EQM = 3.4847)

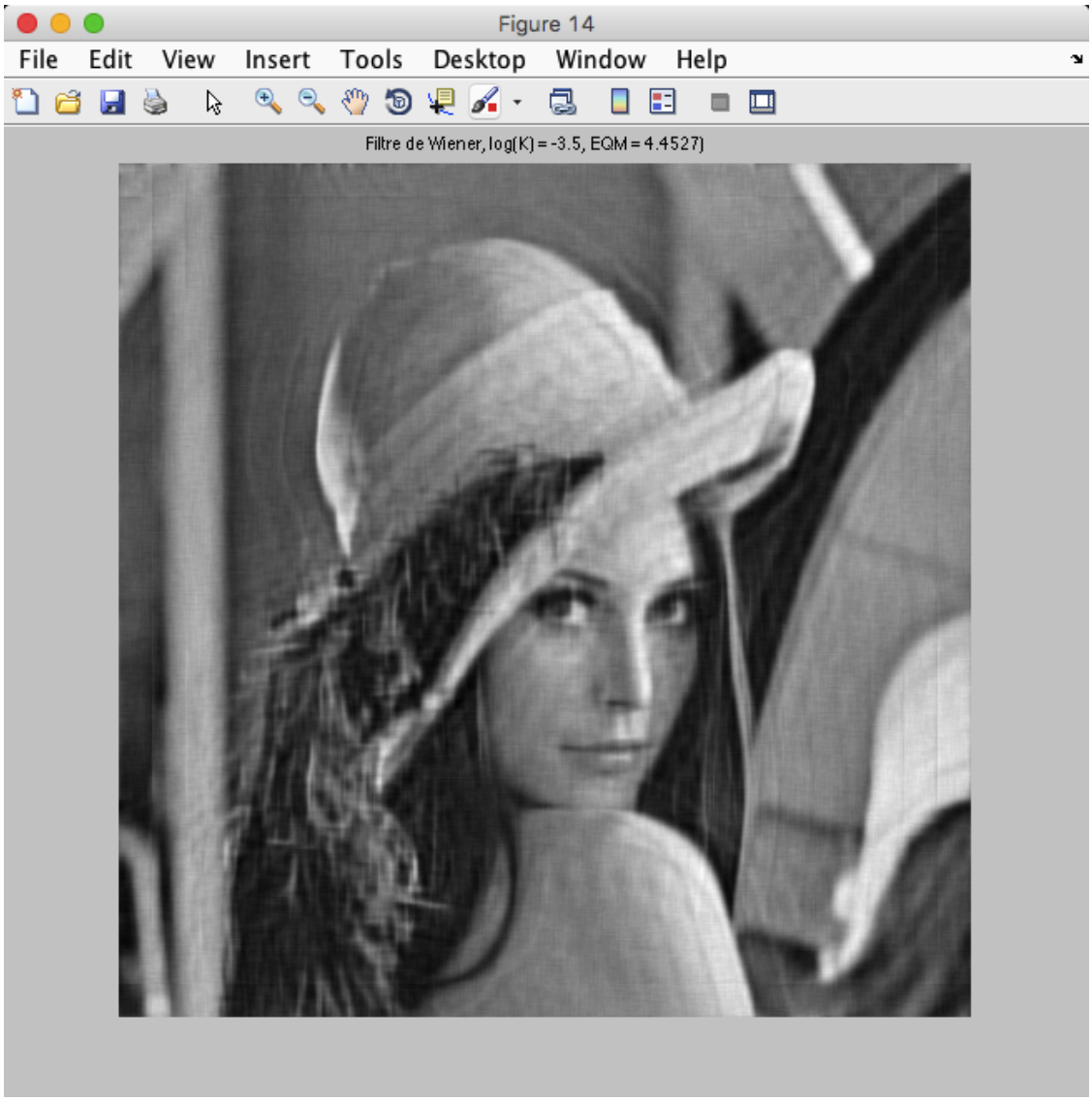


Figure 14
File Edit View Insert Tools Desktop Window Help
Filtre de Wiener, log(K) = -3.5, EQM = 4.4527)

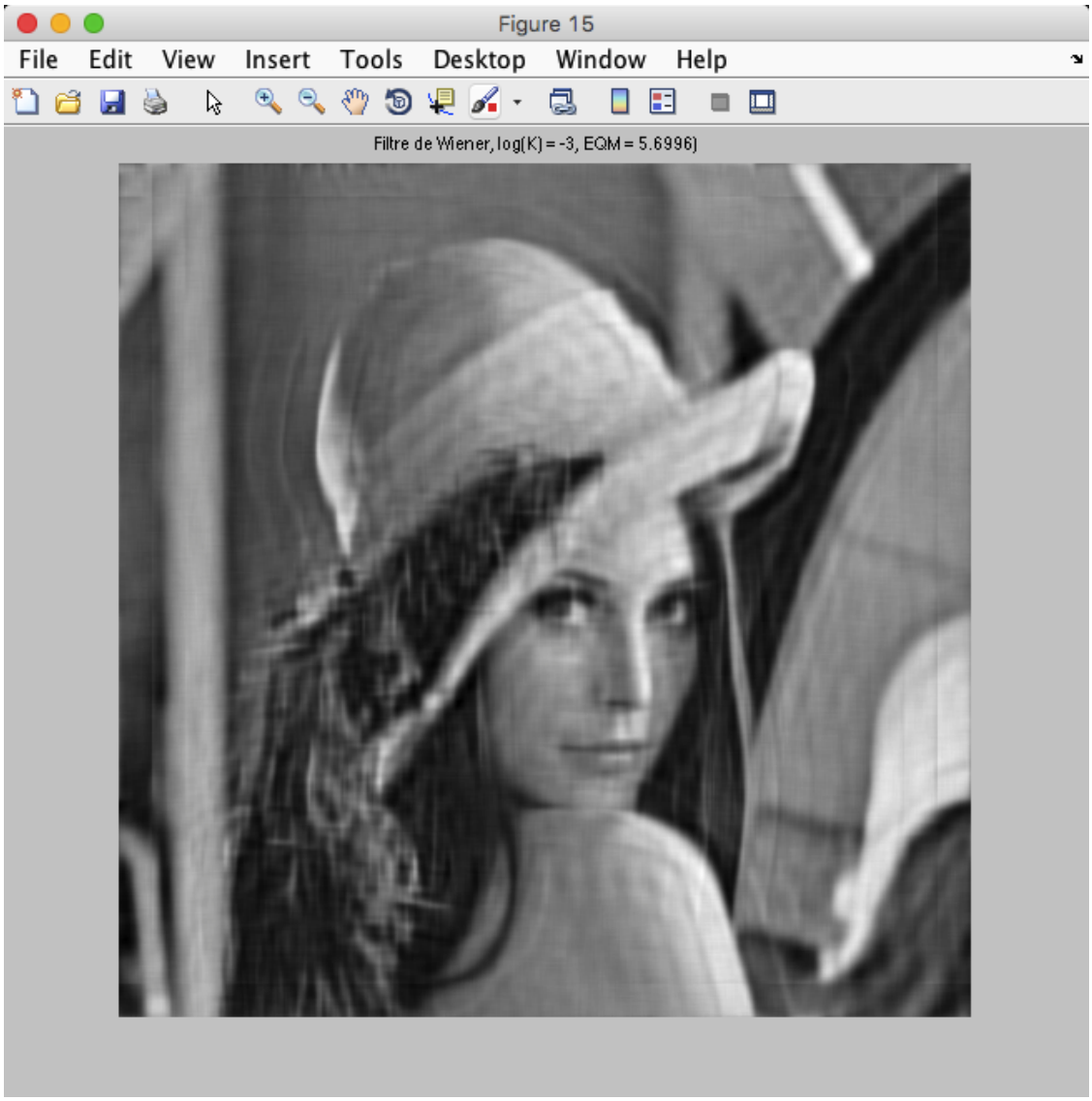


Figure 15
File Edit View Insert Tools Desktop Window Help
Filtre de Wiener, log(K) = -3, EQM = 5.6996)

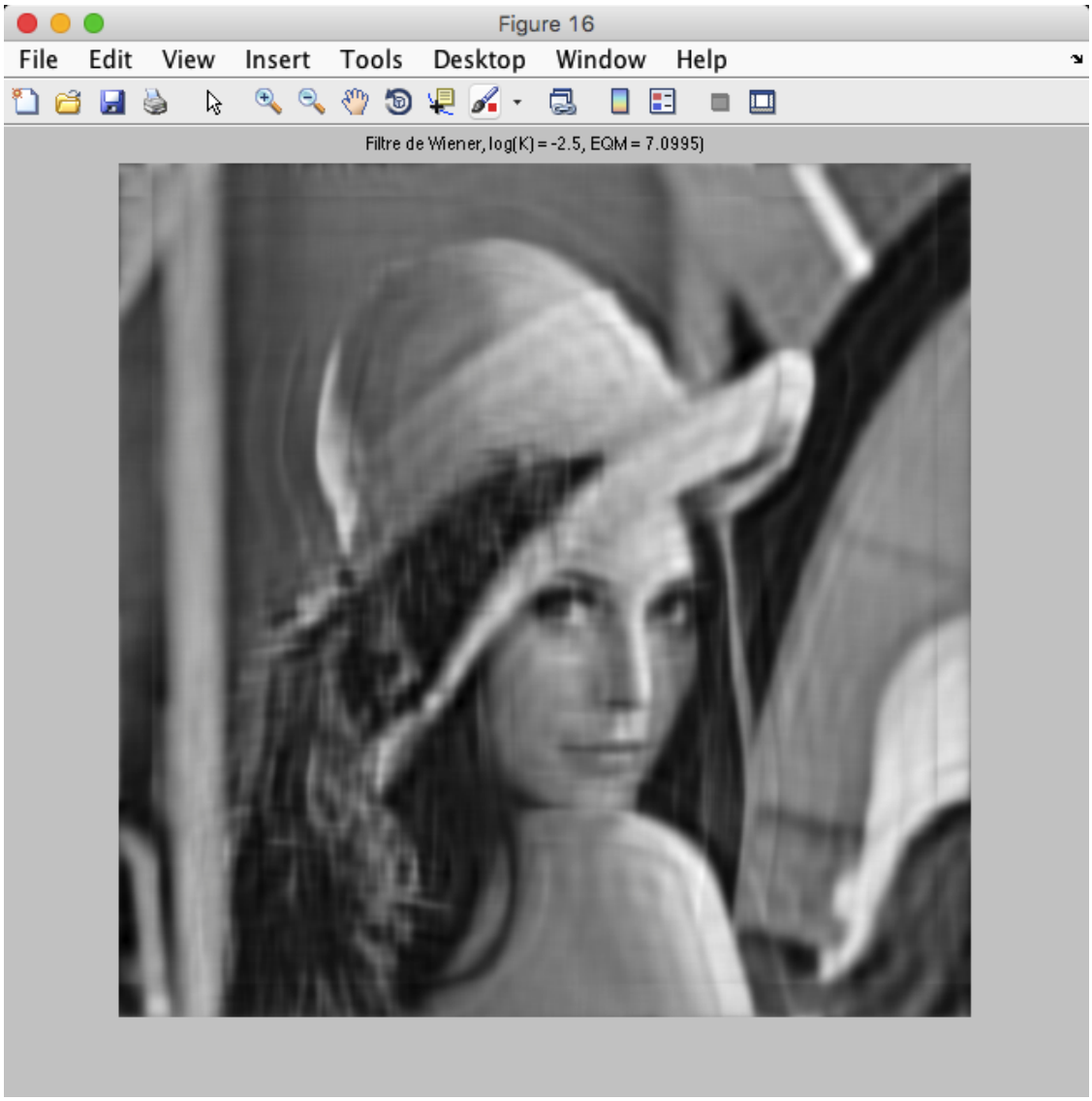


Figure 16
File Edit View Insert Tools Desktop Window Help
Filtre de Wiener, log(K) = -2.5, EQM = 7.0995)

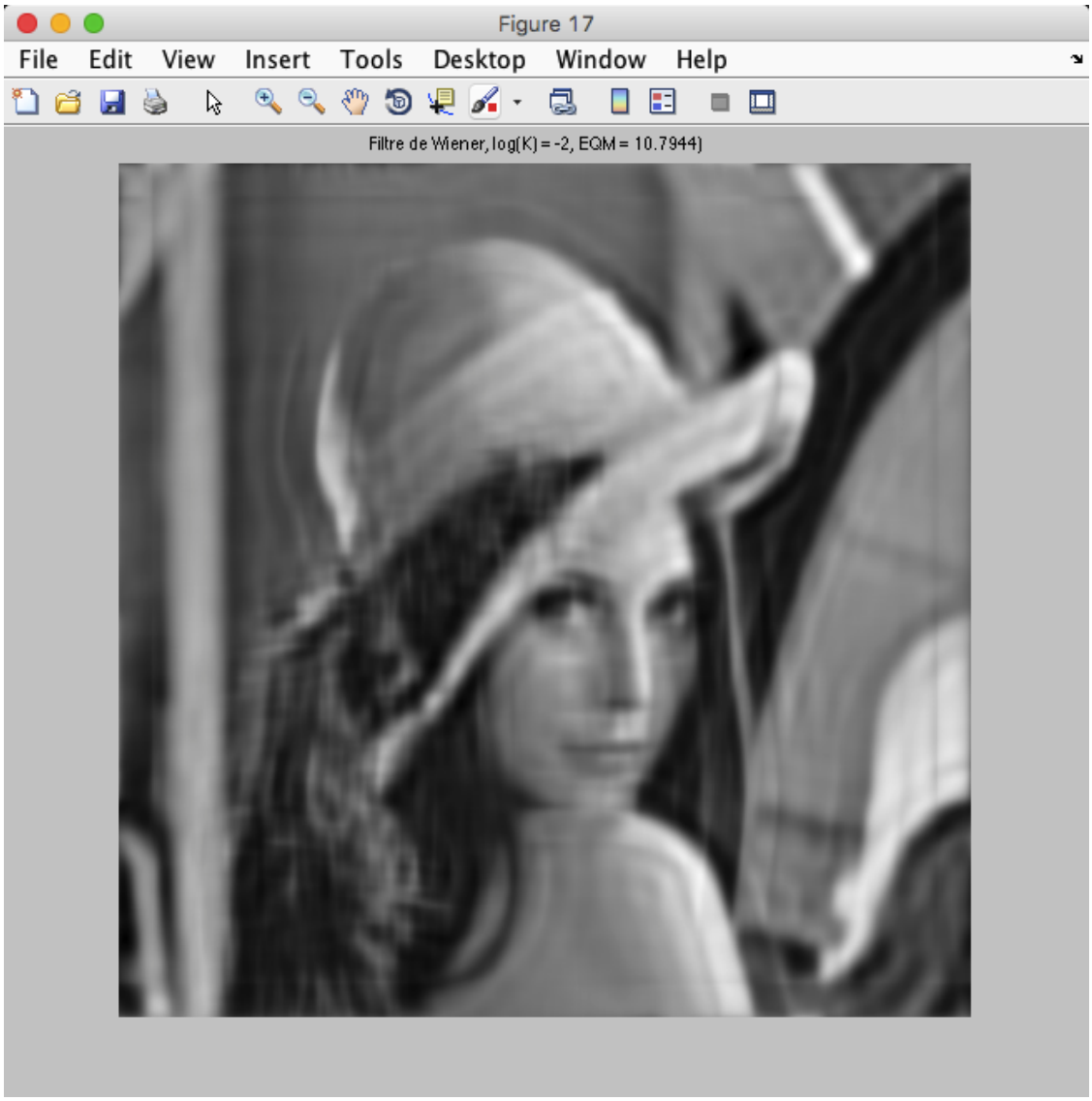


Figure 17
File Edit View Insert Tools Desktop Window Help
Filtre de Wiener, log(K) = -2, EQM = 10.7944)

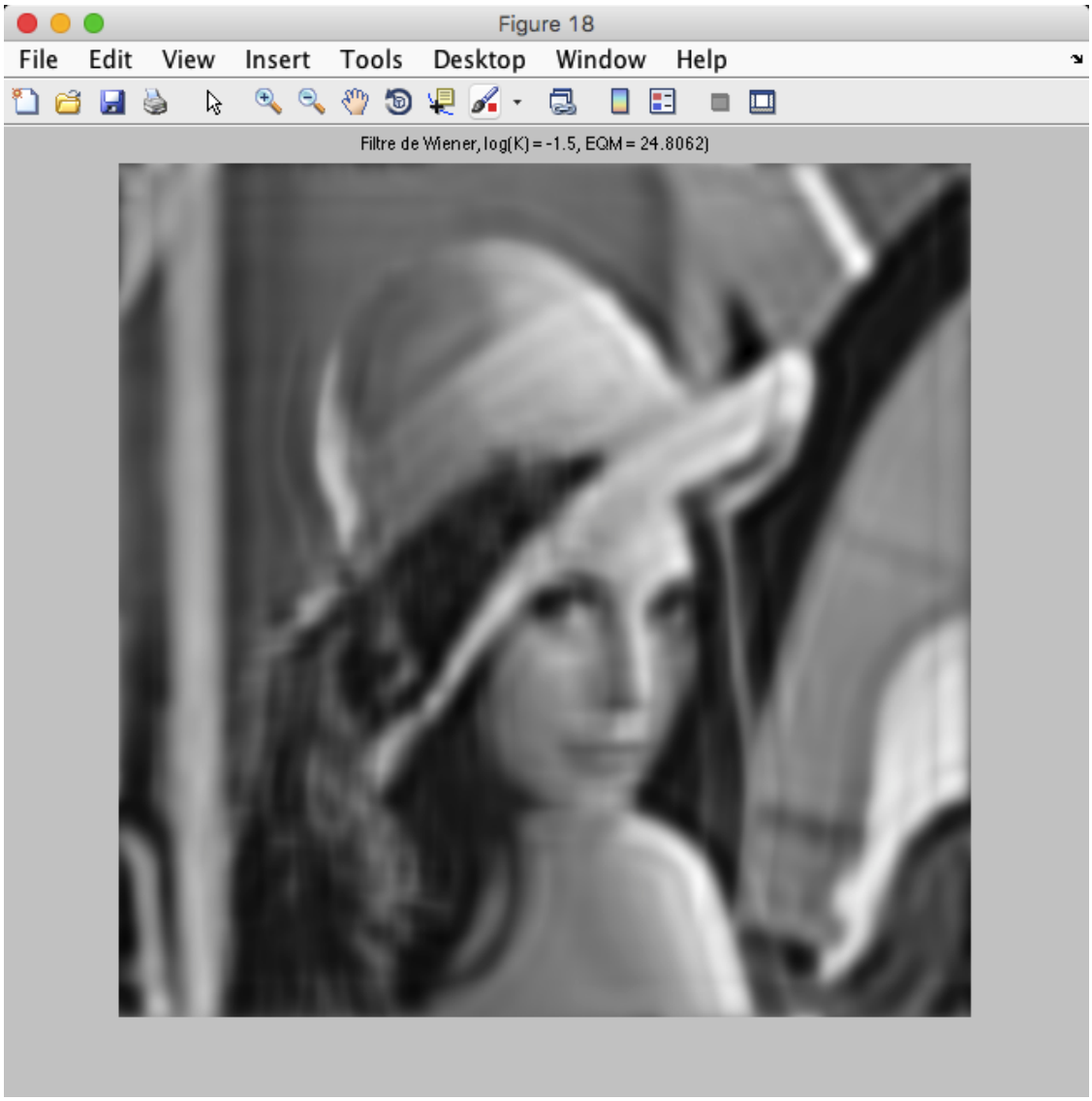
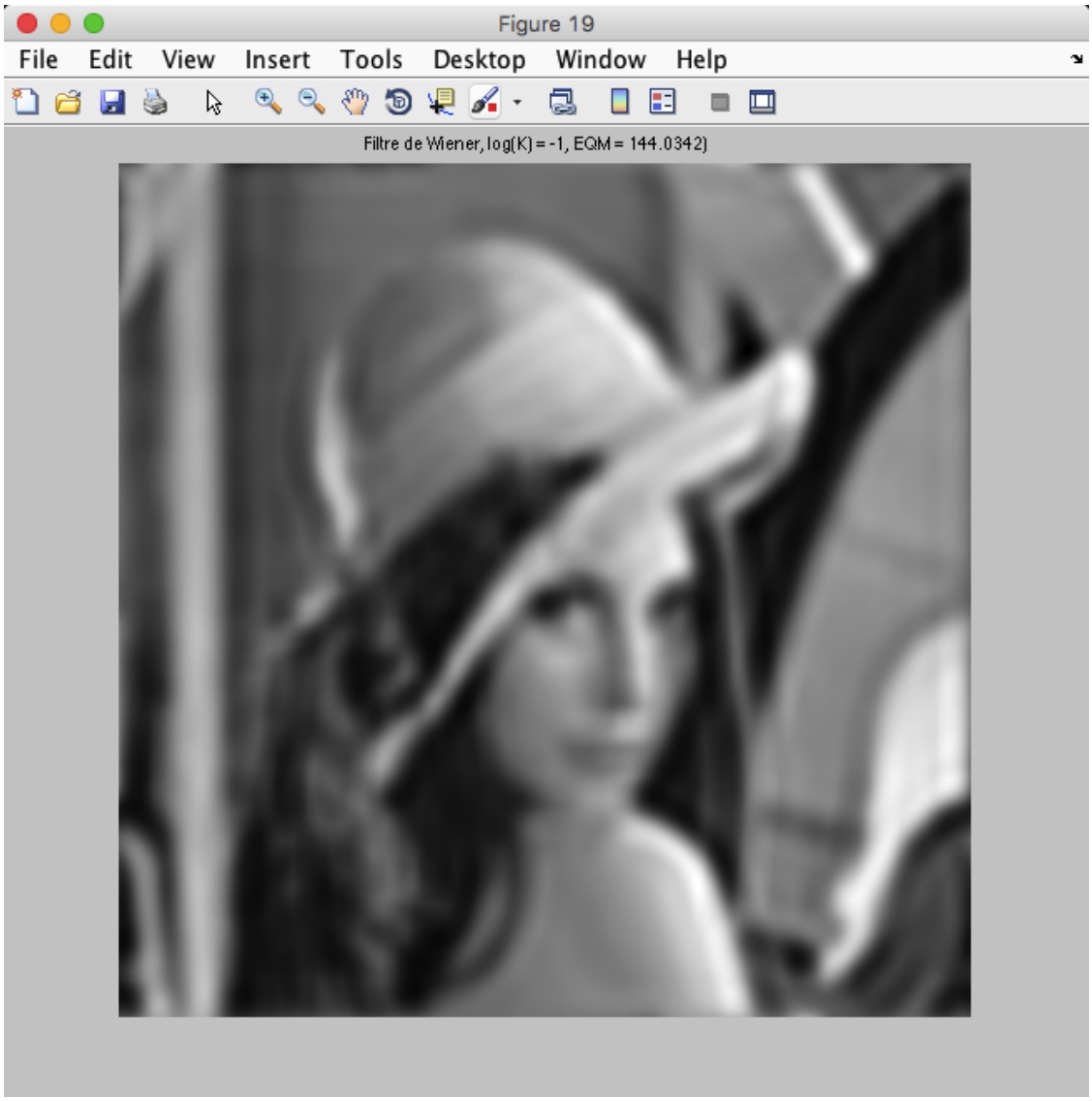


Figure 18
File Edit View Insert Tools Desktop Window Help
Filtre de Wiener, log(K) = -1.5, EQM = 24.8062)



Sans l'option 'circular'

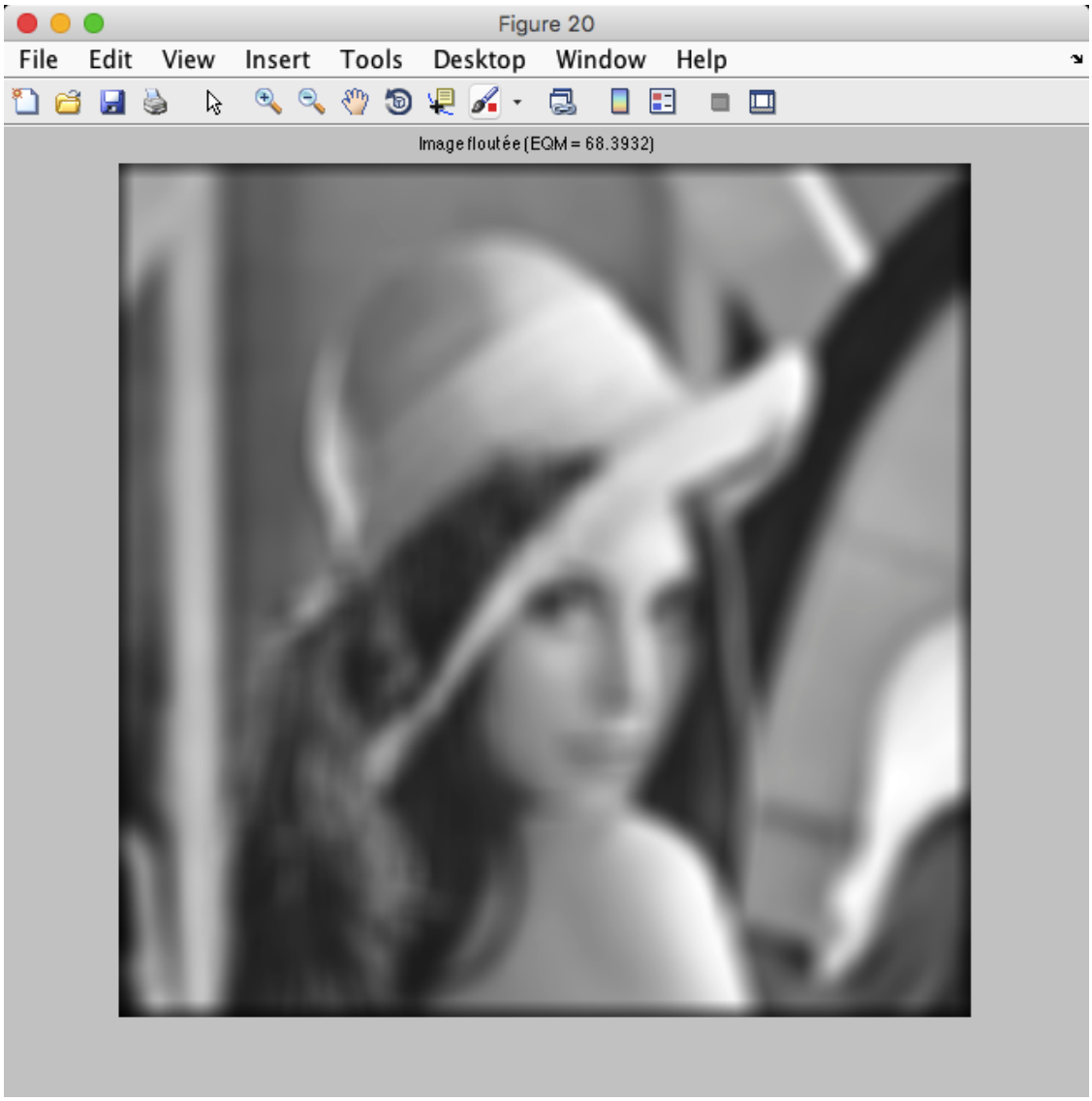


Figure 20
File Edit View Insert Tools Desktop Window Help
Image floutée (EQM = 68.3932)

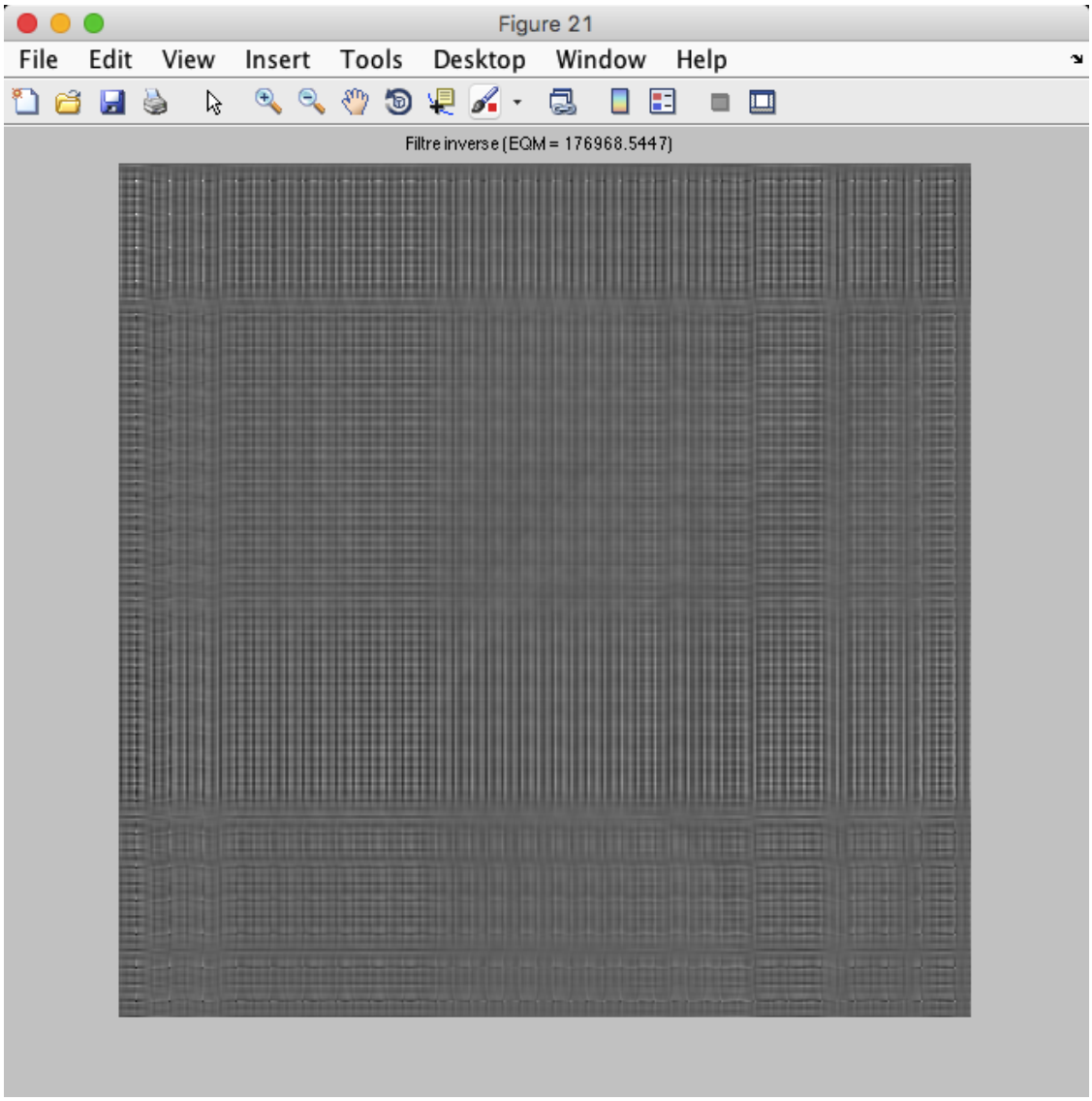


Figure 21
File Edit View Insert Tools Desktop Window Help
Filtre inverse (EQM = 176968.5447)

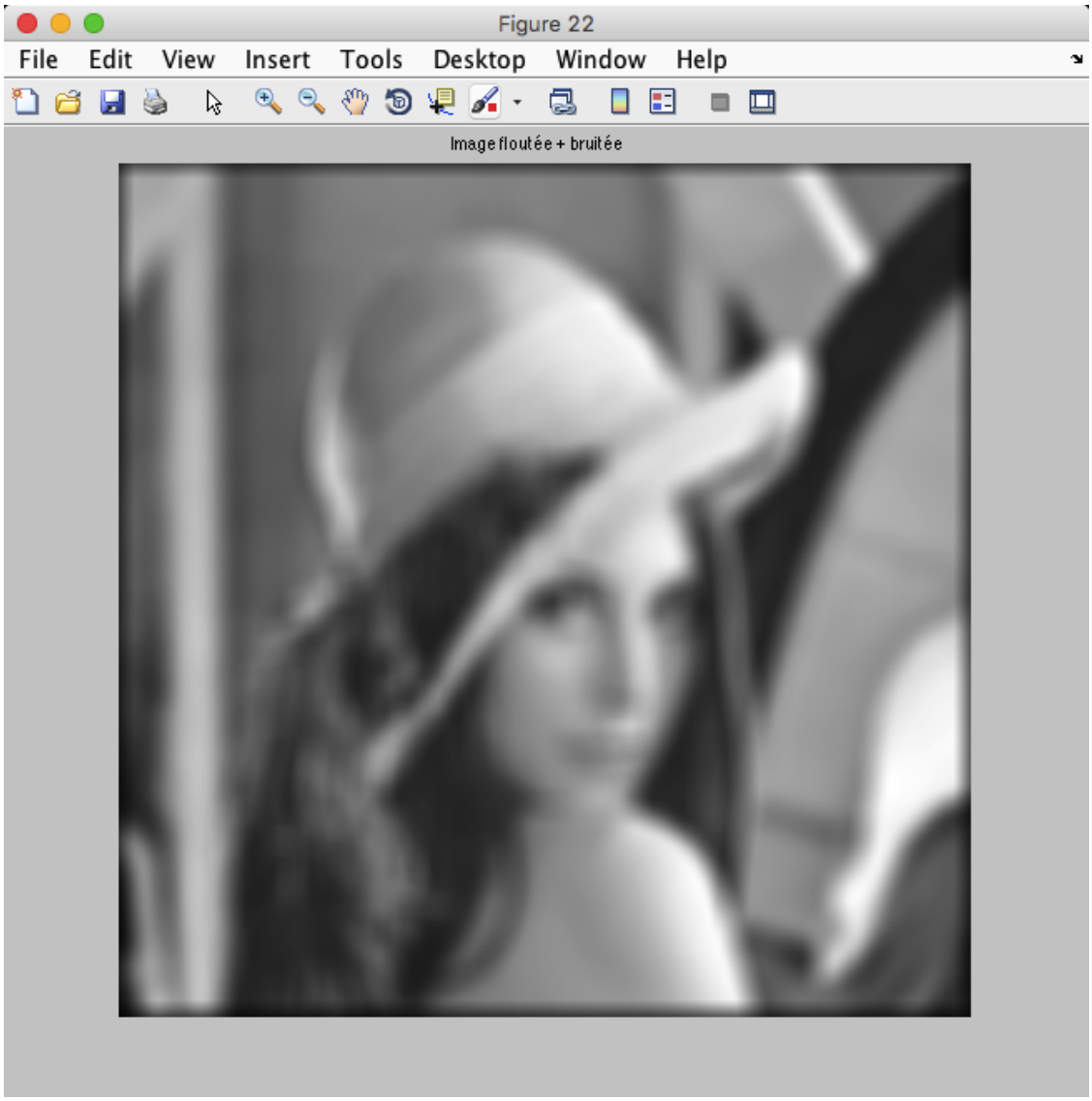


Figure 22
File Edit View Insert Tools Desktop Window Help
Image floutée + bruitée

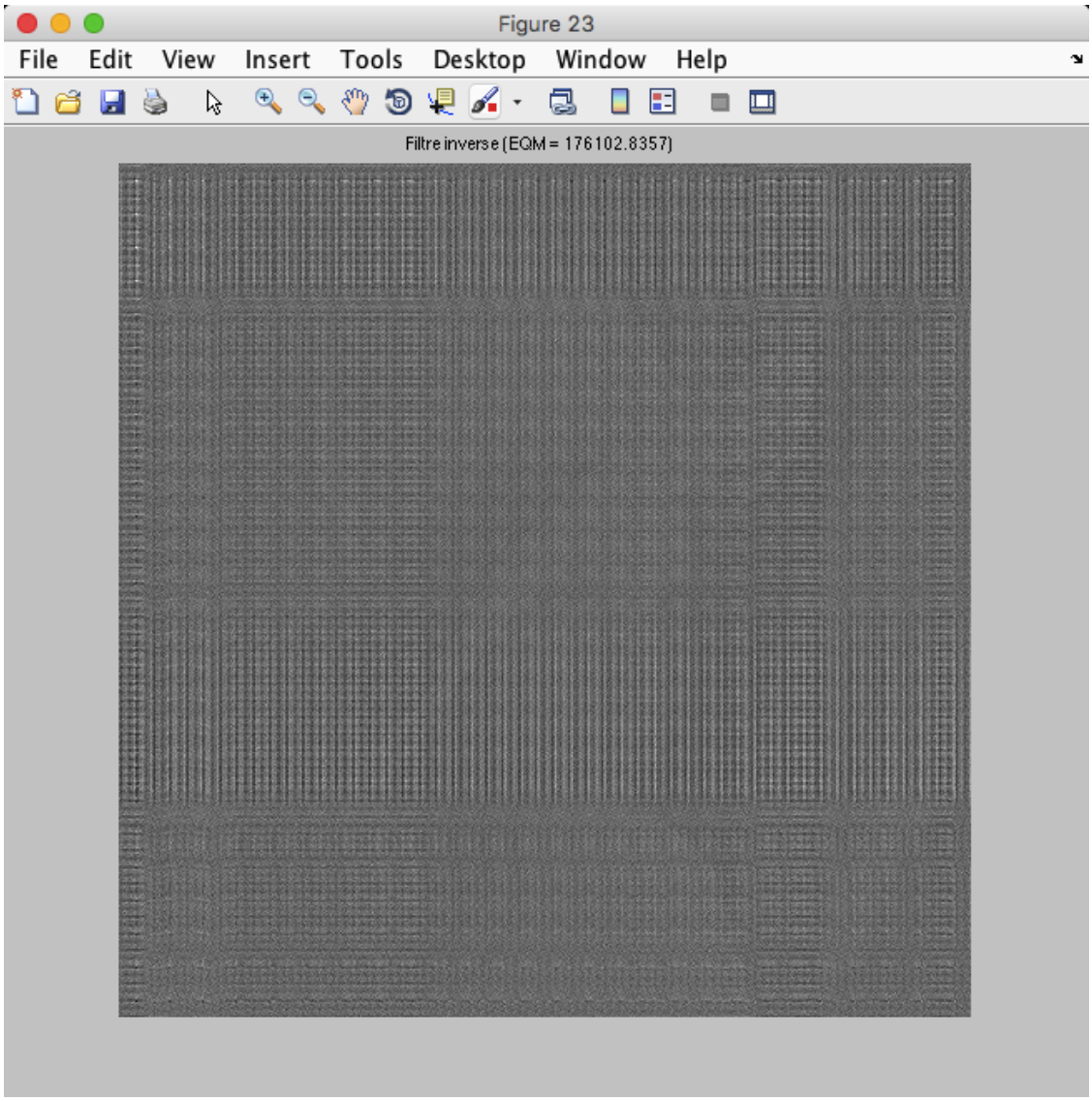
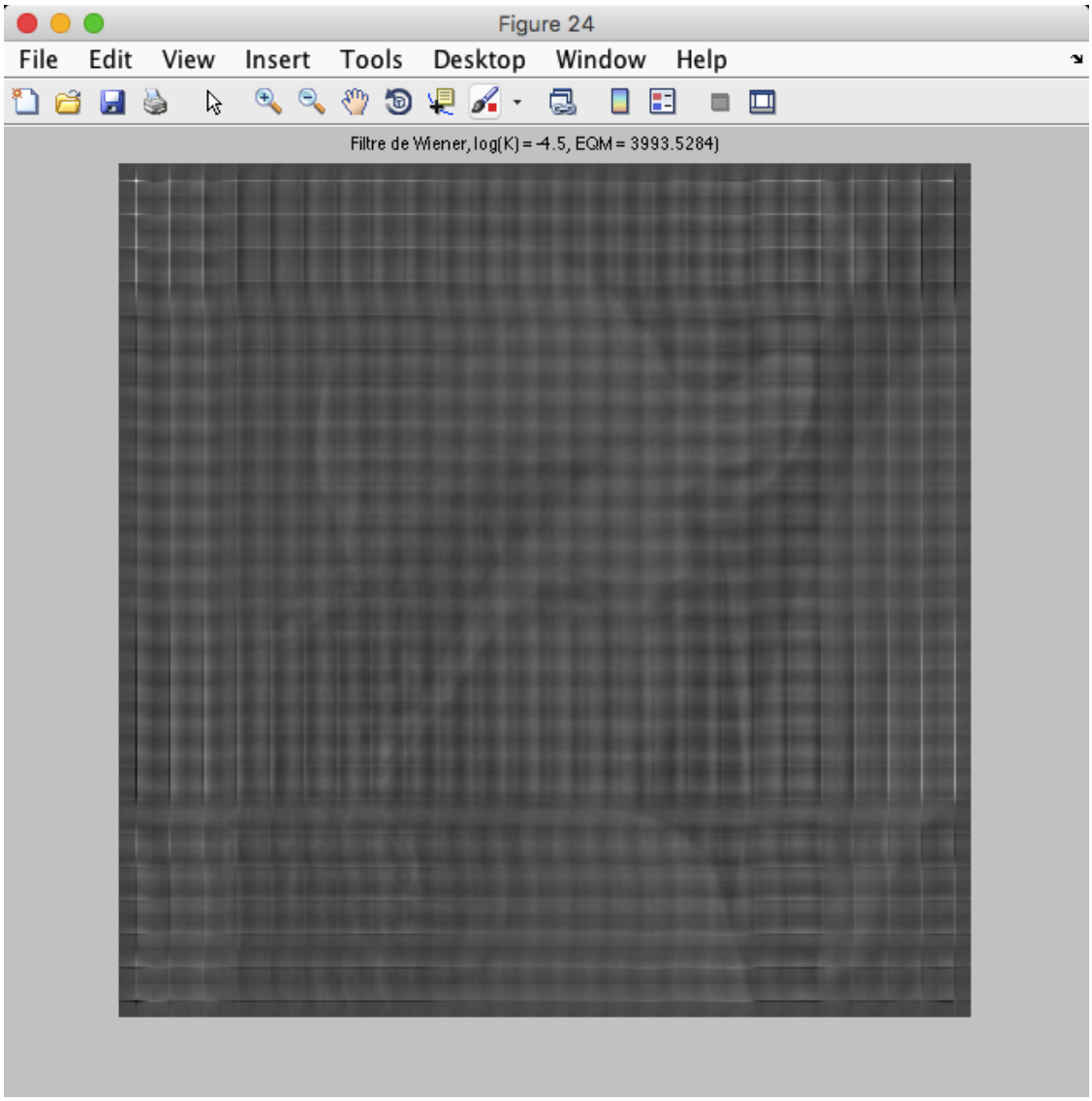


Figure 23
File Edit View Insert Tools Desktop Window Help
Filtre inverse (EQM = 176102.8357)



A retenir :

- Le filtrage inverse ne fonctionne pas car il amplifie considérablement le bruit.
- Le filtre de Wiener est une meilleur alternative. Nécessite de trouver le paramètre optimal représentatif du rapport signal à bruit
- Impact très important du choix de la condition aux bords lors de la convolution (la périodisation, ie convolution circulaire, est l'hypothèse implicite faite lorsqu'on travaille dans le domaine de Fourier)

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