

**REFERENCES AND EXERCISES FOR THE MINICOURSE  
LECTURES ON LYAPUNOV EXPONENTS**

EL HADJI YAYA TALL

1. REFERENCES

- (1) L. Barreira and Ya. Pesin. *Lyapunov exponents and smooth ergodic theory*. Vol 23. Univ. Lectures Series. Amer. Math. Soc., 2002.
- (2) P. Bougerol and J. Lacroix. *Products of random matrices with applications to Schrödinger operator*. Birkhäuser, 1985.
- (3) David Damanik. *Lyapunov exponents and Spectral analysis of ergodic Schrödinger operator: a survey of Kotani theory and its applications*, In: Spectral theory and mathematical physics. Vol 76. Proc. Sympos. Pure Math. Amer. Math. Soc, 2007, pp. 539-563.
- (4) Terence Tao. *Topic in Radom Matrix Theory*, Graduate Studies in Mathematics vol 132.
- (5) Marcelo Viana *Lectures on Lyapunov expoenets*, Vol 145. Cambridge Studies in Advanced Mathematics. Cambridge University Press , 2014.

2. EXERCISES

**Exercise 1.** Let  $p = (p_1, p_2)$ , with  $p_1, p_2 > 0$ , and  $p_1 + p_2 = 1$ . Calculate the Lyapunov exponents for  $p$  and :

- (1)  $A_1 = \begin{pmatrix} \sigma & 0 \\ 0 & \sigma^{-1} \end{pmatrix}$  and  $A_2 = \begin{pmatrix} \sigma^{-1} & 0 \\ 0 & \sigma \end{pmatrix}$  were  $\sigma > 1$ .
- (2)  $A_1 = \begin{pmatrix} \sigma & 0 \\ 0 & \sigma^{-1} \end{pmatrix}$  and  $A_2 = \begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}$ , where  $\sigma > 1$