IOPscience iopscience.iop.org

Home Search Collections Journals About Contact us My IOPscience

A uniform approximation for the fidelity in chaotic systems

This article has been downloaded from IOPscience. Please scroll down to see the full text article.

2003 J. Phys. A: Math. Gen. 36 11915

(http://iopscience.iop.org/0305-4470/36/47/c01)

View the table of contents for this issue, or go to the journal homepage for more

Download details:
IP Address: 171.66.16.89
The article was downloaded on 02/06/2010 at 17:17

Please note that terms and conditions apply.

INSTITUTE OF PHYSICS PUBLISHING JOURNAL OF PHYSICS A: MATHEMATICAL AND GENERAL

J. Phys. A: Math. Gen. **36** (2003) 11915–11916 www.iop.org/Journals/ja PII: S0305-4470(03)68433-7

Corrigendum

A uniform approximation for the fidelity in chaotic systems

Nicholas R Cerruti and Steven Tomsovic 2003 *J. Phys. A: Math. Gen.* **36** 3451–3465

In the previously published figure 4 there was an error in the calculation of the theoretical curves. They were obtained with equation (20) as stated, but $J_2(\lambda)$ was evaluated incorrectly. This resulted in a transition parameter $\Lambda = 0.0444$, instead of the correct semiclassical value of $\Lambda = 0.0395$. Coincidentally, the actual direct quantum evaluation gives $\Lambda = 0.0449$. Since the other parameter f is a function of Λ and was shown to be given well for the standard map by the random matrix theory prediction, figure 4 gave better agreement between the theoretical and standard map than actually exists. The error of 13–14% in the theoretical expression for Λ derives not only from inherent approximations in semiclassical approximations, but also truncation of a series expansion whose successive terms increase in difficulty of evaluation.

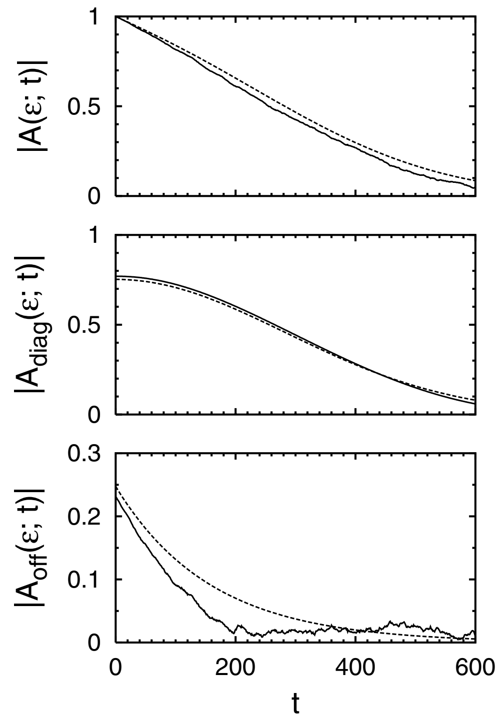

Figure 1. Crossover decay. The upper panel demonstrates the agreement between the quantum standard map (solid curve) and the theoretical results using the semiclassical and random matrix approximations (dashed curve). The middle and lower panel shows each piece of the fidelity (diagonal and off-diagonal) separately and the corresponding theoretical results (Gaussian and exponential). The parameters are $N = 1000$, $\lambda = 18$ and $\epsilon = 5 \times 10^{-4}$.

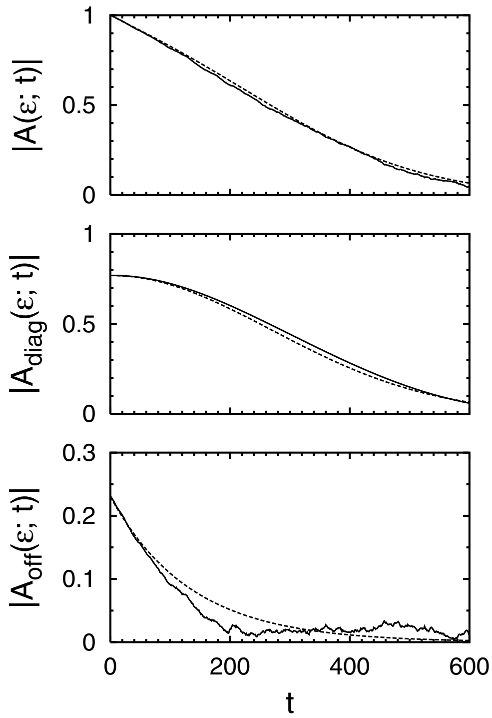

Figure 2. Crossover decay. The upper panel demonstrates the agreement between the quantum standard map (solid curve) and the theoretical results using the true values of $\{\Lambda, f\}$ given in the text (dashed curve). The middle and lower panel shows each piece of the fidelity (diagonal and off-diagonal) separately and the corresponding theoretical results (Gaussian and exponential). The parameters are $N = 1000$, $\lambda = 18$ and $\epsilon = 5 \times 10^{-4}$.

Hence, we show two figures to replace the previous figure 4. The first relies exclusively on the truncated semiclassical and random matrix theory values of $\{\Lambda, f\}$, which illustrates the loss of precision due to their theoretical approximations. The second is based on the true evaluations, and illustrates that the decomposition of the decay into exponential and Gaussian components is extremely accurate.

In addition, there was a misprint in the last term of equation (37). It should read

$$\Lambda \approx \frac{\epsilon^2 N^3}{4(2\pi)^4}[1 + 2J_2(\lambda)]. \tag{37}$$

We gratefully acknowledge communications with Thomas Gorin and Thomas Seligman in which they pointed out a discrepancy that led us to find the incorrect evaluation of $J_2(\lambda)$ and the misprint in the equation.