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<<准混沌冲击振子>>

图书基本信息

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内容概要

《准混沌冲击振子：重正化符号动力学及运动迁移现象（英文版）》介绍了准混沌运动研究的最新进展，讨论了动力系统中有序运动与无序运动交界处的复杂的动力学分支行为。
准混沌运动是由具有自相似结构的稳定运动岛邻域附近运动轨迹的吸引性来刻画的，并且其相空间的位移是随时间的幂指数而渐近增加的。
本专著全面、系统、自成体系地研究了一维经典冲击振子模型，并以完美的形式展示了准混沌运动在物理学和数学上的规则性和复杂性。

《准混沌冲击振子：重正化符号动力学及运动迁移现象（英文版）》包含了目前文献中很多不曾涉及的新内容和新结果，它将激发物理学、应用数学的研究生和学者以及非线性动力学的专家对准混沌运动研究的极大兴趣，是一本难得的教科书或参考书。

John H.
Lowenstein为纽约大学物理系教授，非线性动力系统领域知名科学家，长期专注于一维冲击振子的动力学行为研究并取得了丰硕的成果，其中包括：在低维混沌和准混沌哈密顿系统中的运动迁移现象，区间及多边形分段等距自相似结构的数学理论。

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章节摘录

版权页： 插图： It is not immediately obvious that choosing λ to be a low-degree algebraic inte-ger should help our search for dynamical self-similarity （beyond the restriction that it places on the denominator of the rotation number）. Of course, it is well known that the lowest-degree algebraic integers, solutions of quadratic equations, enjoy algebraic self-similarity in their continued.fraction expansions. Moreover, for one-dimensional maps analogous to piecewise isometries, namely the interval exchange transformations, one has a powerful theorem of Boshernitzan and Carroll （1997） es-tablishing their renormalizability for quadratic irrational parameters. Unfortunately,no comparable theorem for two-dimensional PWI's has been proved. However, for two-dimensional PWI's, the renormalizability of an important class of models with quadratic irrational λ has been rigorously established by Kouptsov et al. （2002） us-ing computer assisted proofs. It is here that the true advantage of the restriction to low-degree algebraic numbers makes itself felt: it makes it possible to use com-puter software to perform exact calculations on specific models, most of which have exceedingly complicated multi-level return map structures, thereby verifying impor-tant properties of each model and, by exhaustion, the entire class. Before examining three particularly interesting models from the class of PWI's of the square with rational rotation numbers and quadratic irrational parameters, it will be useful to illustrate how the systematic search for renormalizable return map structure succeeds in a particularly simple example. The contrast with the λ = 1/2 case will be striking.

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