

APPLICATIONS OF IDE THEORY

Ray Brown¹

¹EEASI Corporation
Houston, Texas 77057

Abstract. This paper presents five examples of using IDE Theory to model scientific and medical systems.

Keywords. nonlinear dynamics, chaos, modeling, simulation, biology

AMS (MOS) subject classification: 37D45

1 Introduction

IDE modeling is an alternative to Newtonian modeling: Newtonian modeling is based on Newton's laws of motion as determined by the sum of all forces acting on a system and is expressed as an ODE. IDE modeling is based the fundamental units of complexity, stretching and folding.

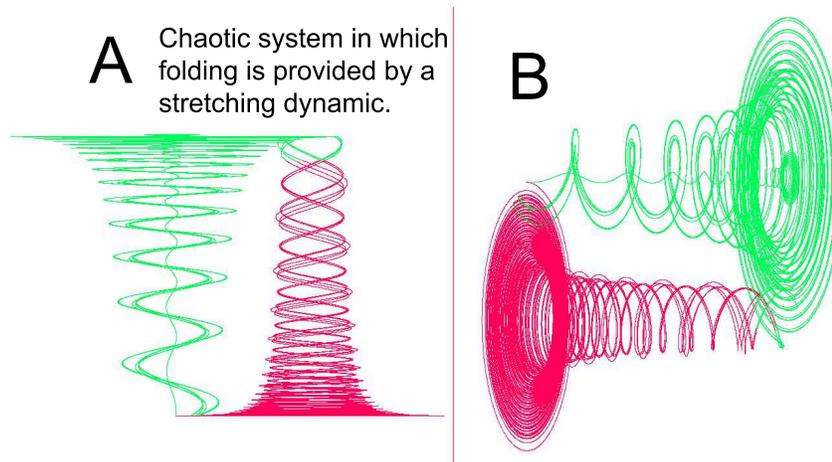


Figure 1: Plate A is a chaotic system in which stretching and folding are both hyperbolic; Plate B is Plate A rotated to provide a second view

Given an $n \times n$ matrix of functions, $\mathbf{A}(\mathbf{X})$, it may be written as $\mathbf{D}(\mathbf{X}) + \mathbf{A}(\mathbf{X}) - \mathbf{D}(\mathbf{X})$ where $\mathbf{D}(\mathbf{X})$ is the diagonal elements. \mathbf{D} is the stretching component and $\mathbf{A} - \mathbf{D}$ is the