Model Documentation of the Lorentz Attractor

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1 Nomenclature

1.1 Nomenclature for Model Equations

x is proportional to convection motions
y is proportional to temperature difference between ascending and descending currents
z is proportional to distortion of vertical temperature profile from linearity
σ Prandtl Number
r quotient of Raileigh Number and a critical value (see [**?**])
b parameter

2 Model Equations

State Vector and Input Vector:

$$\underline{x} = (x_1 \ x_2 \ x_3)^T = (x \ y \ z)^T$$
$$\underline{u} = \emptyset$$

Model Equations:

$$\dot{x} = -\sigma x + \sigma y \tag{1a}$$
$$\dot{y} = -xz + rx - y \tag{1b}$$
$$\dot{z} = xy - bz \tag{1c}$$

Parameters: σ, r, b
Outputs: ⟨not defined⟩

2.1 Exemplary parameter values

Parameter Name	Symbol	Value
Prandtl Number	r	35
Raileight coeff	b	2
Parameter	σ	20

3 Derivation and Explanation

Not available

References

[1] Lorenz, E. N.: *Deterministic Nonperiodic Flow*, p. 135, Journal of Atmospheric Sciences 1963