Defensive Technical Disclosure

Industrial Spectral Process Control Using Energetic Balance Parameter λ*_V2 and Spectral Asymmetry Index Δλ*

Author: Norbert Woiwod
System: ARBE λ*
Version: Industrial Disclosure 1.0
Date: 14 February 2026
Status: Public Technical Documentation

1. Technical Domain

This disclosure relates to industrial color control systems, specifically spectral process evaluation and production release procedures in printing and packaging workflows.

2. Physical Basis

λ*_V2 is defined as the unique solution of the energetic balance equation over 380–730 nm using deterministic Brent root-finding. Δλ* is defined as λ*_V2 minus λ*_EE (equal-energy centroid).

3. Industrial Implementation Procedure

Steps include: spectral measurement (380–730 nm), numerical integration, deterministic root-finding, Δλ* calculation, and threshold-based industrial risk classification.

4. Industrial Classification Thresholds

• |Δλ*| < 2 nm → Spectrally stable (Release)
• 2–5 nm → Moderate asymmetry (Review)
• > 5 nm → High instability risk (Block)

5. Technical Effect

Application of this method reduces metameric deviation, press correction cycles, material waste, and improves batch-to-batch spectral consistency.

6. Workflow Integration

The procedure may be integrated into pre-press QA systems, inline spectrophotometric sensors, automated approval dashboards, and ERP-integrated color management systems.

7. Reproducibility

The method is reproducible using measured reflectance spectra, standard numerical integration, Brent root-finding, and equal-energy centroid calculation.

8. Scope of Disclosure

This publication establishes prior art for industrial use of λ*_V2 energetic balance and Δλ* spectral asymmetry in production release control.