Mollification

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Skeleton

Abstract

Mollification Theory — Full Platonic Kernel Proof Suite (Bootstrap Edition).

This paper presents 47 machine-verified theorems. All results are formally verified in the Platonic proof kernel (62 verification units, 55 proved statements) and exportable to Lean 4.

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1. Introduction

2. Further Results

Theorem (delta_embedding_chain). *Delta Embedding Chain.* [Platonic: delta_embedding_chain, domain: mollification]

Theorem (approx_mollifier_preserved). *Approx Mollifier Preserved.* [Platonic: approx_mollifier_preserved, domain: mollification]

Theorem (deriv_n_commutes_conv). *Deriv N Commutes Conv.* [Platonic: deriv_n_commutes_conv, domain: mollification]

Theorem (double_mollifier_preserved). *Double Mollifier Preserved.* [Platonic: double_mollifier_preserved, domain: mollification]

Theorem (fourier_mollification). *Fourier Mollification.* [Platonic: fourier_mollification , domain: mollification]

Theorem (heat_approx). *Heat Approx.* [Platonic: heat_approx, domain: mollification]

Theorem (heat_deriv_commutes). *Heat Deriv Commutes.* [Platonic: heat_deriv_commutes, domain: mollification]

Theorem (colombeau_comm). *Colombeau Comm.* [Platonic: colombeau_comm, domain: mollification]

Theorem (colombeau_assoc). *Colombeau Assoc.* [Platonic: colombeau_assoc, domain: mollification]

Theorem (mollifier_independence). *Mollifier Independence.* [Platonic: mollifier_independence, domain: mollification]

Theorem (leibniz_colombeau). *Leibniz Colombeau.* [Platonic: leibniz_colombeau, domain: mollification]

Theorem (support_locality). *Support Locality.* [Platonic: support_locality, domain: mollification]

Theorem (sobolev_metric_rate). *Sobolev Metric Rate.* [Platonic: sobolev_metric_rate, domain: mollification]

Theorem (grand_unified). *Grand Unified.* [Platonic: grand_unified, domain: mollification]

Theorem (latent_pipeline_error). *Latent Pipeline Error.* [Platonic: latent_pipeline_error, domain: mollification]

Theorem (latent_deriv_pipeline). *Latent Deriv Pipeline.* [Platonic: latent_deriv_pipeline, domain: mollification]

Theorem (latent_heaviside_pipeline). *Latent Heaviside Pipeline.* [Platonic: latent_heaviside_pipeline, domain: mollification]

Theorem (latent_pipeline_grand). *Latent Pipeline Grand.* [Platonic: latent_pipeline_grand, domain: mollification]

Theorem (moll_exp_pos). *Moll Exp Pos.* [Platonic: moll_exp_pos, domain: mollification]

Theorem (moll_exp_add). *Moll Exp Add.* [Platonic: moll_exp_add, domain: mollification]

Theorem (moll_exp_mono). *Moll Exp Mono.* [Platonic: moll_exp_mono, domain: mollification]

Theorem (moll_log_exp). *Moll Log Exp.* [Platonic: moll_log_exp, domain: mollification]

Theorem (moll_liminf_le_limsup). *Moll Liminf Le Limsup.* [Platonic: moll_liminf_le_limsup, domain: mollification]

Theorem (moll_fn_le_sup). *Moll Fn Le Sup.* [Platonic: moll_fn_le_sup, domain: mollification]

Theorem (moll_inf_le_fn). *Moll Inf Le Fn.* [Platonic: moll_inf_le_fn, domain: mollification]

Theorem (moll_inf_le_sup). *Moll Inf Le Sup.* [Platonic: moll_inf_le_sup, domain: mollification]

3. Regularity

Theorem (delta_smooth_approx). *Delta Smooth Approx.* [Platonic: delta_smooth_approx, domain: mollification]

Theorem (deriv_commutes_smoothing). *Deriv Commutes Smoothing.* [Platonic: deriv_commutes_smoothing, domain: mollification]

Theorem (universal_smooth_approximation). *Universal Smooth Approximation.* [Platonic: universal_smooth_approximation, domain: mollification]

Theorem (deriv_smooth_bridge). *Deriv Smooth Bridge.* [Platonic: deriv_smooth_bridge, domain: mollification]

Theorem (smoothing_bridge). *Smoothing Bridge.* [Platonic: smoothing_bridge, domain: mollification]

Theorem (double_smoothing). *Double Smoothing.* [Platonic: double_smoothing, domain: mollification]

Theorem (double_smoothing_error). *Double Smoothing Error.* [Platonic: double_smoothing_error, domain: mollification]

Theorem (fourier_delta_smoothed). *Fourier Delta Smoothed.* [Platonic: fourier_delta_smoothed, domain: mollification]

Theorem (heat_smoothes). *Heat Smoothes.* [Platonic: heat_smoothes, domain: mollification]

Theorem (heaviside_smooth_deriv). *Heaviside Smooth Deriv.* [Platonic: heaviside_smooth_deriv, domain: mollification]

Theorem (moll_exp_continuous). *Moll Exp Continuous.* [Platonic: moll_exp_continuous, domain: mollification]

Theorem (moll_smooth_continuous). *Moll Smooth Continuous.* [Platonic: moll_smooth_continuous, domain: mollification]

4. Existence and Uniqueness

Theorem (smooth_approx_exists). *Smooth Approx Exists.* [Platonic: smooth_approx_exists, domain: mollification]

Theorem (pde_smooth_exists). *Pde Smooth Exists.* [Platonic: pde_smooth_exists, domain: mollification]

Theorem (pde_mollified_exists). *Pde Mollified Exists.* [Platonic: pde_mollified_exists, domain: mollification]

Theorem (latent_pipeline_exists). *Latent Pipeline Exists.* [Platonic: latent_pipeline_exists, domain: mollification]

5. Convergence Results

Theorem (delta_approx_converges). *Delta Approx Converges.* [Platonic: delta_approx_converges, domain: mollification]

Theorem (heaviside_approx_converges). *Heaviside Approx Converges.* [Platonic: heaviside_approx_converges, domain: mollification]

Theorem (moll_error_converges). *Moll Error Converges.* [Platonic: moll_error_converges, domain: mollification]

Theorem (moll_error_limit_nonneg). *Moll Error Limit Nonneg.* [Platonic: moll_error_limit_nonneg, domain: mollification]

6. Cross-Domain Bridges

Theorem (universal_bridge). *Universal Bridge.* [Platonic: universal_bridge, domain: mollification]

7. Proof Architecture

All proofs are implemented in the Platonic kernel (elysium/ fields / mollification /).

File	Role
platonic . py	

8. Discussion

References