Computational Instances

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Skeleton

Abstract

Computational Instances: concrete elements with determined values.

This paper presents 28 machine-verified theorems building on 2 established facts and 47 hypotheses. All results are formally verified in the Platonic proof kernel (151 verification units, 28 proved statements) and exportable to Lean 4.

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1. Introduction

2. Further Results

Theorem (inst_gsa_exact). *Inst Gsa Exact.* [Platonic: inst_gsa_exact, domain: computational_instances]

Theorem (inst_res_uncertainty). *Inst Res Uncertainty.* [Platonic: inst_res_uncertainty, domain: computational_instances]

Theorem (inst_res_exact). *Inst Res Exact.* [Platonic: inst_res_exact, domain: computational_instances]

Theorem (inst_jet_square_derivative). *Inst Jet Square Derivative.* [Platonic: inst_jet_square_derivative, domain: computational_instances]

Theorem (inst_jet_second_deriv). *Inst Jet Second Deriv.* [Platonic: inst_jet_second_deriv, domain: computational_instances]

Theorem (inst_coin_cryst). *Inst Coin Cryst.* [Platonic: inst_coin_cryst, domain: computational_instances]

Theorem (inst_bat_diss). *Inst Bat Diss.* [Platonic: inst_bat_diss, domain: computational_instances]

Theorem (inst_gas_compress). *Inst Gas Compress.* [Platonic: inst_gas_compress, domain: computational_instances]

Theorem (inst_gas_large_ratio). *Inst Gas Large Ratio.* [Platonic: inst_gas_large_ratio, domain: computational_instances]

Theorem (inst_vet_sat). *Inst Vet Sat.* [Platonic: inst_vet_sat, domain: computational_instances]

Theorem (inst_spring_decaying). *Inst Spring Decaying.* [Platonic: inst_spring_decaying, domain: computational_instances]

Theorem (inst_smoke_positive_effect). *Inst Smoke Positive Effect.* [Platonic: inst_smoke_positive_effect, domain: computational_instances]

Theorem (inst_water_trivial). *Inst Water Trivial.* [Platonic: inst_water_trivial, domain: computational_instances]

Theorem (inst_phi_fp). *Inst Phi Fp.* [Platonic: inst_phi_fp, domain: computational_instances]

Theorem (inst_phi_exact). *Inst Phi Exact.* [Platonic: inst_phi_exact, domain: computational_instances]

Theorem (inst_mt_dep_le_sz). *Inst Mt Dep Le Sz.* [Platonic: inst_mt_dep_le_sz, domain: computational_instances]

Theorem (inst_sp_fe). *Inst Sp Fe.* [Platonic: inst_sp_fe, domain: computational_instances]

Theorem (inst_thm_ver_le). *Inst Thm Ver Le.* [Platonic: inst_thm_ver_le, domain: computational_instances]

Theorem (inst_uc_C1). *Inst Uc C1.* [Platonic: inst_uc_C1, domain: computational_instances]

Theorem (inst_uc_C2). *Inst Uc C2.* [Platonic: inst_uc_C2, domain: computational_instances]

Theorem (inst_uc_C3). *Inst Uc C3.* [Platonic: inst_uc_C3, domain: computational_instances]

Theorem (inst_uc_C4). *Inst Uc C4.* [Platonic: inst_uc_C4, domain: computational_instances]

Theorem (inst_uc_C5). *Inst Uc C5.* [Platonic: inst_uc_C5, domain: computational_instances]

Theorem (inst_uc_C6). *Inst Uc C6.* [Platonic: inst_uc_C6, domain: computational_instances]

Theorem (inst_uc_rho_pos). *Inst Uc Rho Pos.* [Platonic: inst_uc_rho_pos, domain: computational_instances]

Theorem (inst_uc_disorder). *Inst Uc Disorder.* [Platonic: inst_uc_disorder, domain: computational_instances]

3. Bounds and Estimates

Theorem (inst_gsa_bound). *Inst Gsa Bound.* [Platonic: inst_gsa_bound, domain: computational_instances]

Theorem (inst_circle_bound). *Inst Circle Bound.* [Platonic: inst_circle_bound, domain: computational_instances]

4. Formal Framework

Hypotheses

- H_x0_norm: X0 Norm
- H_x0_rho: X0 Rho
- H_gsa_spectral: Gsa Spectral
- H_osc_E: Osc E
- H_osc_bw: Osc Bw
- H_res_unc: Res Unc
- H_par_val: Par Val

- H_par_d1: Par D1
- H_par_d2: Par D2
- H_coin_H: Coin H
- H_coin_K: Coin K
- H_cryst: Cryst
- H_bat_mag: Bat Mag
- H_bat_diss: Bat Diss
- H_diss_nn: Diss Nn
- H_gas_mi: Gas Mi
- H_gas_ma: Gas Ma
- H_compress: Compress
- H_vet_age: Vet Age
- H_vet_sat: Vet Sat
- H_spring_val: Spring Val
- H_spring_flow_neg: Spring Flow Neg
- H_smoke_gt: Smoke Gt
- H_water_ord: Water Ord
- H_water_sm_pos: Water Sm Pos
- H_ph_bound: Ph Bound
- H_phi_fp: Phi Fp
- H_phi_kap: Phi Kap
- H_expr_dep: Expr Dep
- H_expr_sz: Expr Sz
- H_circ_wind: Circ Wind
- H_circ_len_pos: Circ Len Pos
- H_tp_bound: Tp Bound
- H_sp_cost: Sp Cost
- H_sp_ent: Sp Ent
- H_fe_def: Fe Def
- H_thm_ver_le: Thm Ver Le
- H_thm_deg_pos: Thm Deg Pos
- H_uc_flow: Uc Flow
- H_uc_tens: Uc Tens
- H_uc_ent: Uc Ent
- H_uc_ord_bnd: Uc Ord Bnd
- H_uc_lam: Uc Lam
- H_uc_kap: Uc Kap
- H_uc_res: Uc Res
- H_uc_dep: Uc Dep
- H_uc_rho: Uc Rho

Established Facts

- mt_expr: Mt Expr
- ci_ts_cost: Ci Ts Cost

5. Proof Architecture

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

File	Role
computational_instances_proof.py	

6. Discussion

References