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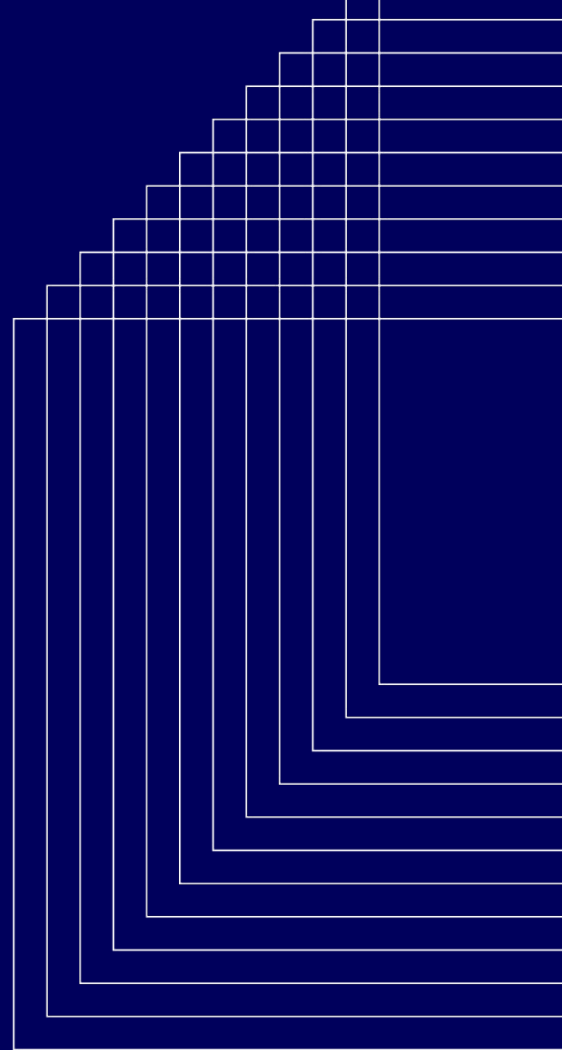
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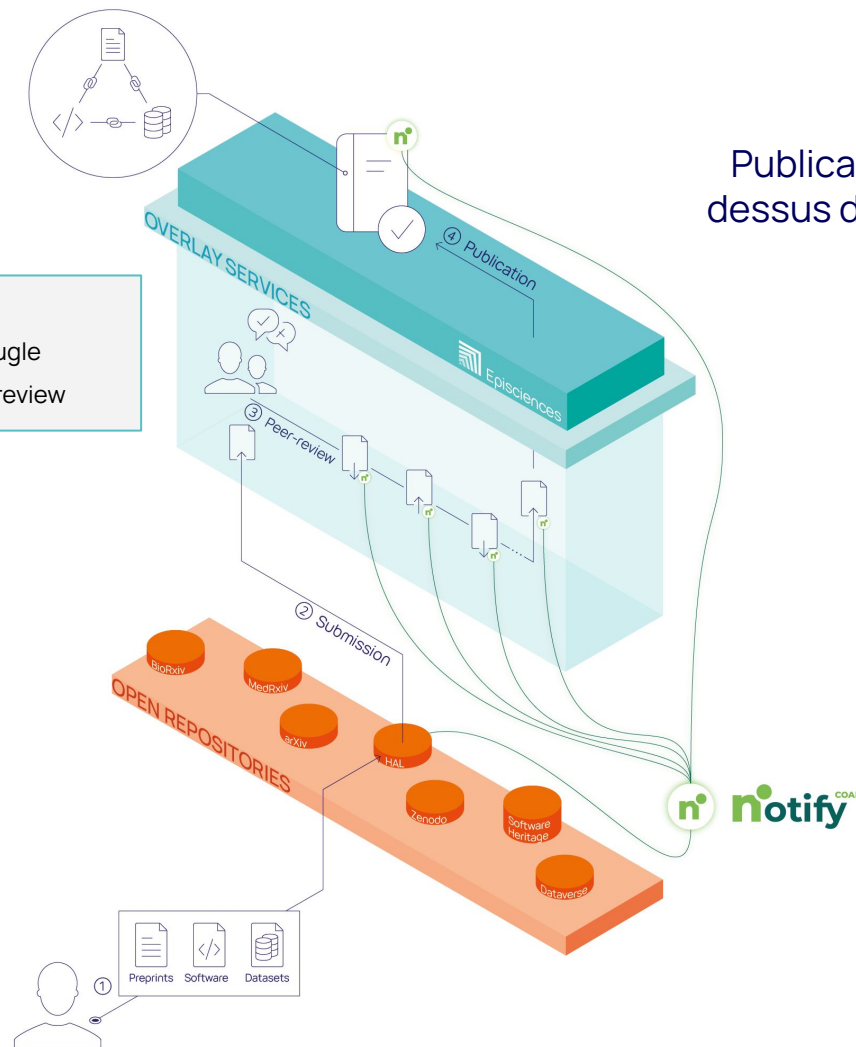
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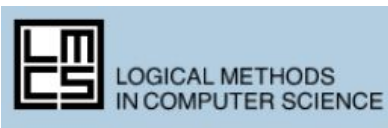
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Inapproximability of Unique Games in Fixed-Point Logic with Counting
Authors: *Jamie Tucker-Foltz.*

— We study the extent to which it is possible to approximate the optimal value of a Unique Games instance in Fixed-Point Logic with Counting (FPC). Formally, we prove lower bounds against the accuracy of FPC-interpretations that map Unique Games instances (encoded as relational structures) to rational numbers giving the approximate fraction of constraints that can be satisfied. We prove two new FPC-inexpressibility results for Unique Games: the existence of a $(1/2, 1/3 + \delta)$ -inapproximability gap, and inapproximability to within any constant factor. Previous recent work has established similar FPC-inapproximability results for a small handful of other problems. Our construction builds upon some of these ideas, but contains a novel technique. While most FPC-inexpressibility results are based on variants of the CFI-construction, ours is significantly different. We start with a graph of very large girth and label the edges with random affine vector spaces over \mathbb{F}_2 that determine the constraints in the two structures. Duplicator's strategy involves maintaining a partial isomorphism over a minimal tree that spans the pebbled vertices of the graph.

Volume 20, Issue 2
Published on April 10, 2024

Boolean proportions
Authors: *Christian Antic.*

— The author has recently introduced an abstract algebraic framework of analogical proportions within the general setting of universal algebra. This

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Mathematics > Logic

[Submitted on 15 Feb 2018 (this version), latest version 23 Apr 2020 (v10)]

Writability and reachability for alpha-tape infinite time Turing machines

Merlin Carl, Benjamin Rin, Philipp Schlicht

Infinite time Turing machines with tape length α (denoted T_α) were introduced by Rin to strengthen the ω -tape machines of Hamkins and Kidder. It is known that for some countable ordinals α , these machines' properties are quite different from those of the ω -tape case. We answer a question of Rin about the size of the least ordinal δ such that not all cells are halting positions of T_δ by giving various characterizations of δ . For instance, it is the least ordinal with any of the properties (a) there is a T_α -writable real that is not T_δ -writable for some $\alpha < \delta$, (b) δ is uncountable in L_{λ_δ} , or (c) δ is a regular cardinal in L_{λ_δ} , where λ_δ denotes the supremum of ordinals with a T_δ -writable code of length δ . We further use these characterizations together with an analogue to Welch's submodel characterization of the ordinals λ , ζ and Σ , to show that δ is closed under the function $\alpha \mapsto \Sigma_\alpha$, where Σ_α denotes the supremum of the ordinals with a T_α -accidentally writable code of length α .

Subjects: **Logic (math.LO)**; Logic in Computer Science (cs.LO)

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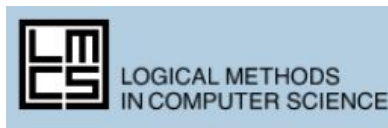
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Merlin Carl ; Benjamin Rin ; Philipp Schlicht - Reachability for infinite time Turing machines with long tapes

Reachability for infinite time Turing machines with long tapes

Authors: Merlin Carl ; Benjamin Rin ; Philipp Schlicht

Infinite time Turing machine models with tape length α , denoted T_α , strengthen the machines of Hamkins and Kidder [HL00] with tape length ω . A new phenomenon is that for some countable ordinals α , some cells cannot be halting positions of T_α given trivial input. The main open question in [Rin14] asks about the size of the least such ordinal δ . We answer this by providing various characterizations. For instance, δ is the least ordinal with any of the following properties: (a) For some $\xi < \alpha$, there is a T_ξ -writable but not T_α -writable subset of ω . (b) There is a gap in the T_α -writable ordinals. (c) α is uncountable in L_{λ_α} . Here λ_α denotes the supremum of T_α -writable ordinals, i.e. those with a T_α -writable code of length α . We further use the above characterizations, and an analogue to Welch's submodel characterization of the ordinals λ , ζ and Σ , to show that δ is large in the sense that it is a closure point of the function $\alpha \mapsto \Sigma_\alpha$, where Σ_α denotes the supremum of the T_α -accidentally writable ordinals.

Keywords: Mathematics - Logic, Computer Science - Logic in Computer Science

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[Submitted on 15 Feb 2018 (v1), last revised 23 Apr 2020 (this version, v10)]

Reachability for infinite time Turing machines with long tapes

Merlin Carl, Benjamin Rin, Philipp Schlicht

Infinite time Turing machine models with tape length α , denoted T_α , strengthen the machines of Hamkins and Kidder [HL00] with tape length ω . A new phenomenon is that for some countable ordinals α , some cells cannot be halting positions of T_α given trivial input. The main open question in [Rin14] asks about the size of the least such ordinal δ . We answer this by providing various characterizations. For instance, δ is the least ordinal with any of the following properties: (a) For some $\xi < \alpha$, there is a T_ξ -writable but not T_α -writable subset of ω . (b) There is a gap in the T_α -writable ordinals. (c) α is uncountable in L_{λ_α} . Here λ_α denotes the supremum of T_α -writable ordinals, i.e. those with a T_α -writable code of length α . We further use the above characterizations, and an analogue to Welch's submodel characterization of the ordinals λ , ζ and Σ , to show that δ is large in the sense that it is a closure point of the function $\alpha \mapsto \Sigma_\alpha$, where Σ_α denotes the supremum of the T_α -accidentally writable ordinals.

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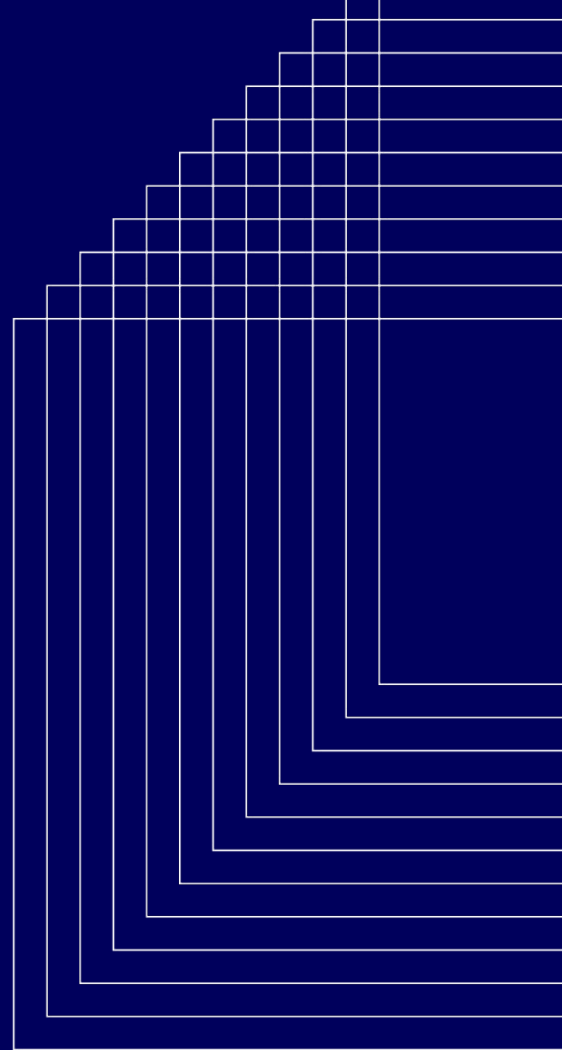


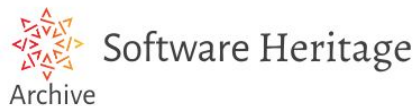
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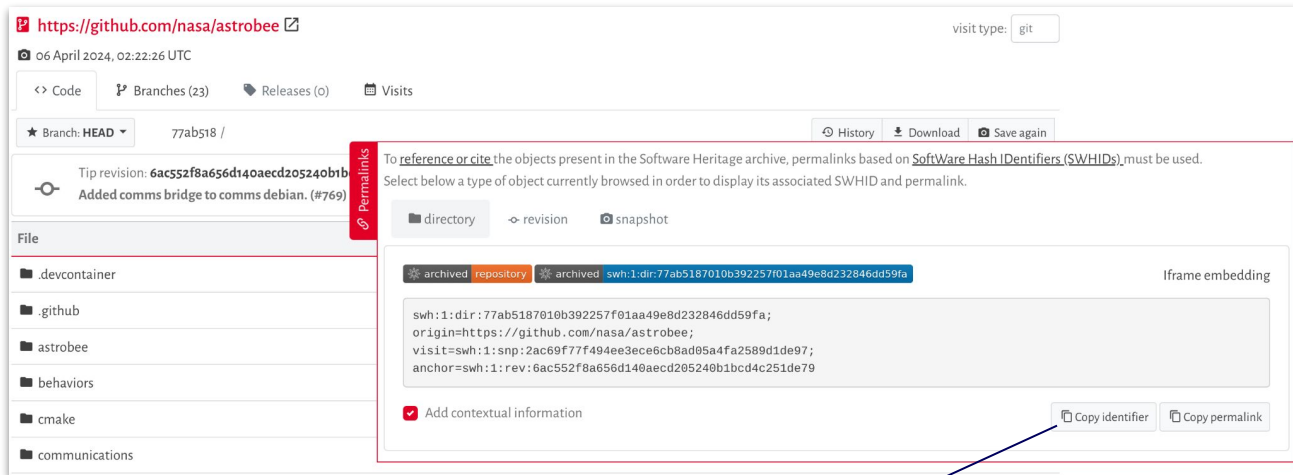




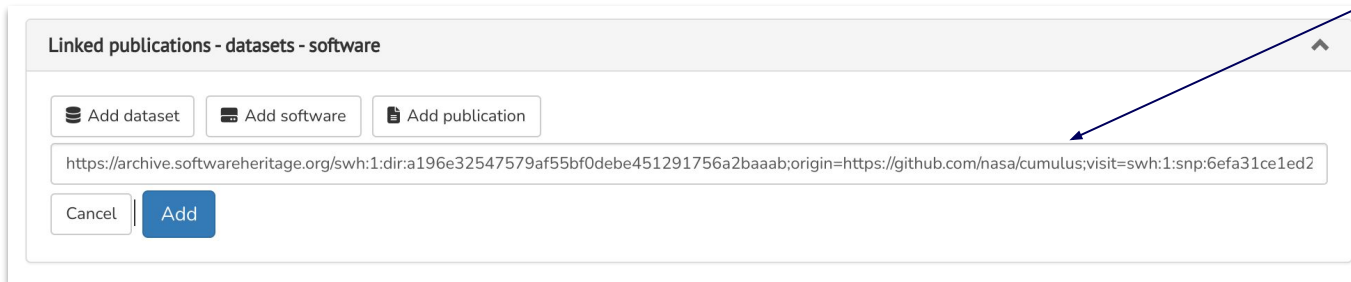
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The screenshot shows a dialog box titled 'Linked publications - datasets - software'. It contains three buttons: 'Add dataset', 'Add software', and 'Add publication'. Below these buttons is a text input field containing the SWHID and permalink: `https://archive.softwareheritage.org/swh:1:dir:a196e32547579af55bf0debe451291756a2baaab;origin=https://github.com/nasa/cumulus;visit=swh:1:snp:6efa31ce1ed2`. At the bottom of the dialog are 'Cancel' and 'Add' buttons.

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Stéphane André ; Camille Noël - Solving viscoelastic problems with a Laplace transform approach supplanted by ARX models, suggesting a way to upgrade Finite Element or spectral codes
jtcam:10304 - Journal of Theoretical, Computational and Applied Mechanics, October 10, 2023 - <https://doi.org/10.46298/jtcam.10304>

Solving viscoelastic problems with a Laplace transform approach supplanted by ARX models, suggesting a way to upgrade Finite Element or spectral codes Article

Authors: Stéphane André ^{1,2}; Camille Noël ^{3,4}

¹ Laboratoire Énergies et Mécanique Théorique et Appliquée
² Laboratoire d'Énergétique et Mécanique Théorique et Appliquée [LEMTA]
³ Laboratoire Cogitamus
⁴ Laboratoire Cogitamus = Cogitamus Laboratory

Finite Element codes used for solving the mechanical equilibrium equations in transient problems associated to (time-dependent) viscoelastic media generally relies on time-discretized versions of the selected constitutive law. Recent concerns about the use of non-integer differential equations to describe viscoelasticity or well-founded ideas based upon the use of a behavior's law directly derived from Dynamic Mechanical Analysis (DMA) experiments in frequency domain, could make the Laplace domain approach particularly attractive if embedded in a time discretized scheme. Based upon the inversion of Laplace transforms, this paper shows that this aim is not only possible but also gives rise to a simple algorithm having good performances in terms of computation times and precision. Such an approach, which fully relies on the Laplace-defined Behavioral Transfer Function (LTBF) can be promoted if it uses AutoRegressive with eXogeneous input parametric models perfectly substitutable to the real LTBF. They avoid the hitherto prohibitive pitfall of having to store all past data in the computer's memory while maintaining an equal computation precision.


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Solving viscoelastic problems with a Laplace transform approach supplanted by ARX models, suggesting a way to upgrade Finite Element or spectral codes

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Finite Element codes used for solving the mechanical equilibrium equations in transient problems associated to (time-dependent) viscoelastic media generally relies on time-discretized versions of the selected constitutive law. Recent concerns about the use of non-integer differential equations to describe viscoelasticity or well-founded ideas based upon the use of a behavior's law directly derived from Dynamic Mechanical Analysis experiments in frequency domain, could make the Laplace domain approach particularly attractive if embedded in a time discretized scheme. Based upon the inversion of Laplace transforms, this paper shows that this aim is not only possible but also gives rise to a simple algorithm having good performances in terms of computation time and precision. Such an approach, which fully relies on the Laplace-defined Behavior or Transfer Function (LBF) can be promoted if it uses AutoRegressive with eXogenous input parametric models perfectly substitutable to the real LTF. They avoid the hitherto prohibitive pitfall of having to store all past data in the computer's memory while maintaining an equal computation precision.

Keywords: Laplace transform, ARX models, iterative algorithm, viscoelasticity, fractional relaxation kernels

1 Introduction

To be firmly characterized, the ViscoElastic (VE) behavior of solid materials requires a mathematical model associated to this rheology, as well as a metrological approach to correctly identify the involved physical parameters. For a Representative Elementary Volume (REV) of viscoelastic media, the model relates in a biunivocal correspondence both the stress and the strain applying onto this REV as a function of time. In the case of linear viscoelasticity, these variables are linked through a simple convolution product in time domain which kernel describes the VE behavior (relaxation or retardation depending on whether the strain or the stress are considered for the excitation). Through the convolution theorem, using Laplace or Laplace-Carson transforms of the behavior's model—one should call it the "transfer function" of the material—is a standard approach to compute the response (or output) of the material to a given time-dependent solicitation (or input) (Tschogerl 1986). This is particularly true since the development of numerical algorithms that perform inverse Laplace transform precisely (Davies and Martin 1979; de Hoog et al. 1982; Dingfelder and Weideman 2014; den Ijger 2006; Stehfest 1970; Talbot 1979). The transfer function formally corresponds to the output obtained for a Dirac delta distribution (pulse) considered as input. Inherent to experiments in solid mechanics, the case of the impulse response in quasi-static conditions cannot be obtained as in other scientific fields (the flash method for instance to measure the thermal diffusivity of materials (Lemaitre and Descomens 2003)). Therefore, given

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Agbossou, A., A. Bergeret, K. Benzarti, and N. Alberola (1993). Modelling of the viscoelastic behaviour of amorphous thermoplastic/glass beads composites based on the evaluation of the complex Poisson's ratio of the polymer matrix. Journal of Materials Science 28(7):1963-1972. <https://hal.science/hal-04209403/>

Agbossou, A., A. Bergeret, K. Benzarti, and N. Alberola (1993). Modelling of the viscoelastic behaviour of amorphous thermoplastic/glass beads composites based on the evaluation of the complex Poisson's ratio of the polymer matrix. Journal of Materials Science 28(7):1963-1972. [doi], [hal]. [10.1007/bf00595770](https://doi.org/10.1007/bf00595770)

André, S., J. Boisse, and C. Noûs (2021). An FFT solver used for virtual Dynamic Mechanical Analysis experiments: Application to a glassy/amorphous system and to a particulate composite. Journal of Theoretical, Computational and Applied Mechanics. [doi], [oa]. [10.46298/jtcam.6450](https://doi.org/10.46298/jtcam.6450)

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1. Agbossou, A., A. Bergeret, K. Benzarti, and N. Alberola (1993). Modelling of the viscoelastic behaviour of amorphous thermoplastic/glass beads composites based on the evaluation of the complex Poisson's ratio of the polymer matrix. *Journal of Materials Science* 28(7):1963-1972. <https://hal.science/hal-04209403/>
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8. Cuna, C. (2001). The DNLB approach and relaxation phenomena. Part I: Historical account and DNLB formalism. *Mechanics of Time-Dependent Materials*

Exemple

Publication

Solving viscoelastic problems with a Laplace transform approach supplanted by ARX models, suggesting a way to upgrade Finite Element or spectral codes ArticleAuthors: Stéphane André ¹; Camille Noûs ² Laboratoire Énergies et Mécanique Théorique et Appliquée Laboratoire Cogitamus

Finite Element codes used for solving the mechanical equilibrium equations in transient problems concerns about the use of non-integer differential equations to describe viscoelasticity or well-f frequency domain, could make the Laplace domain approach particularly attractive if embedded in a time discretized scheme. Based upon the inversion of Laplace transforms, this paper shows that this aim is not only possible but also gives rise to a simple algorithm having good performances in terms of computation times and precision. They avoid the hitherto prohibitive pitfall of having to store all past data in the computer's memory while maintaining an equal computation precision.

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Keywords: Laplace transform, ARX models, iterative algorithm, Viscoelasticity, Fractional relaxation

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Solving viscoelastic problems with a Laplace transform approach supplanted by ARX models, suggesting a way to upgrade Finite Element or spectral codes Stéphane ANDRÉ^{1,2} and  Camille NOÛS²¹ Université de Lorraine, CNRS, LEMTA, F-54000 Nancy, France² Cogitamus Laboratory, F-75005 Paris, France

Finite Element codes used for solving the mechanical equilibrium equations in transient problems associated to (time-dependent) viscoelastic media generally relies on time-discretized versions of the selected constitutive law. Recent concerns about the use of non-integer differential equations to describe viscoelasticity or well-founded ideas based upon the use of a behavior's law directly derived from Dynamic Mechanical Analysis experiments in frequency domain, could make the Laplace domain approach particularly attractive if embedded in a time discretized scheme. Based upon the inversion of Laplace transforms, this paper shows that this aim is not only possible but also gives rise to a simple algorithm having good performances in terms of computation times and precision. Such an approach, which fully relies on the Laplace-defined Behavior or Transfer Function (LTBF) can be promoted if it uses AutoRegressive with eXogeneous input parametric models perfectly substitutable to the real LTBF. They avoid the hitherto prohibitive pitfall of having to store all past data in the computer's memory while maintaining an equal computation precision.

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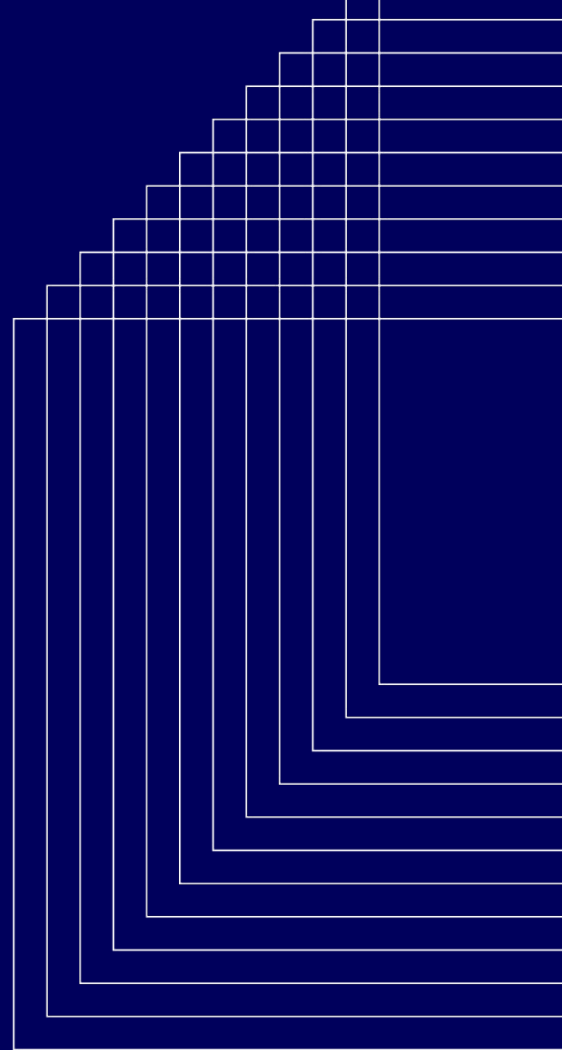
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Enrichissement des métadonnées



Enrichissement automatiques des métadonnées

Nested Hoare Triples and Frame Rules for Higher-order Store

Authors: Jan Schwinghammer ; Lars Birkedal  ; Bernhard Reus  ; Hongseok Yang

Separation logic is a Hoare-style logic for reasoning about programs with heap-allocated mutable data structures. As a step toward extending separation logic to high-level languages with ML-style general (higher-order) storage, we investigate the compatibility of nested Hoare triples with several variations of higher-order frame rules. The interaction of nested triples and frame rules can be subtle, and the inclusion of certain frame rules is in fact unsound. A particular combination of rules can be shown consistent by means of a Kripke model where worlds live in a recursively defined ultrametric space. The resulting logic allows us to elegantly prove programs involving stored code. In particular, using recursively defined assertions, it leads to natural specifications and proofs of invariants required for dealing with recursion through the store.

[https://doi.org/10.2168/LMCS-7\(3:21\)2011](https://doi.org/10.2168/LMCS-7(3:21)2011)

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Volume: Volume 7, Issue 3

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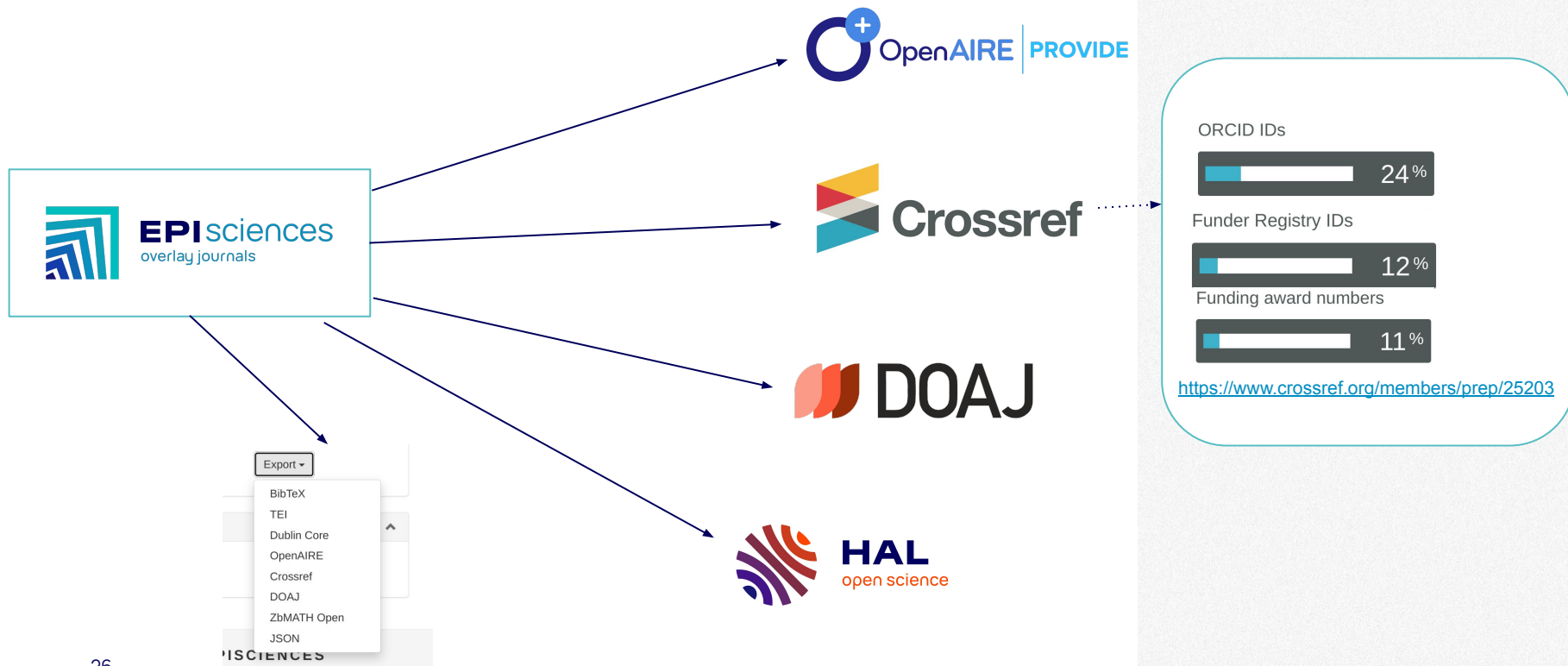
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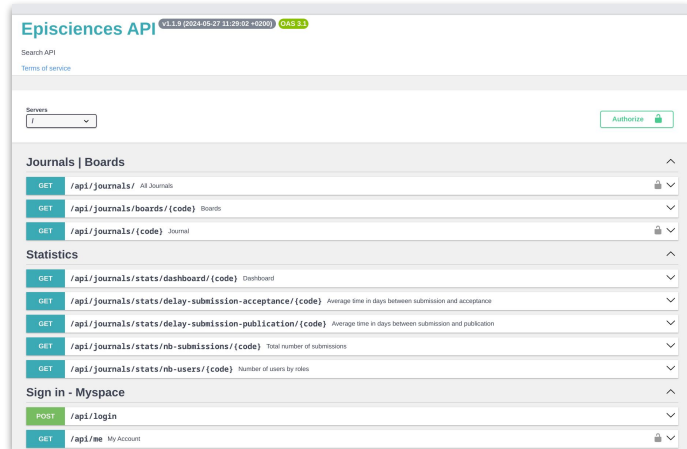


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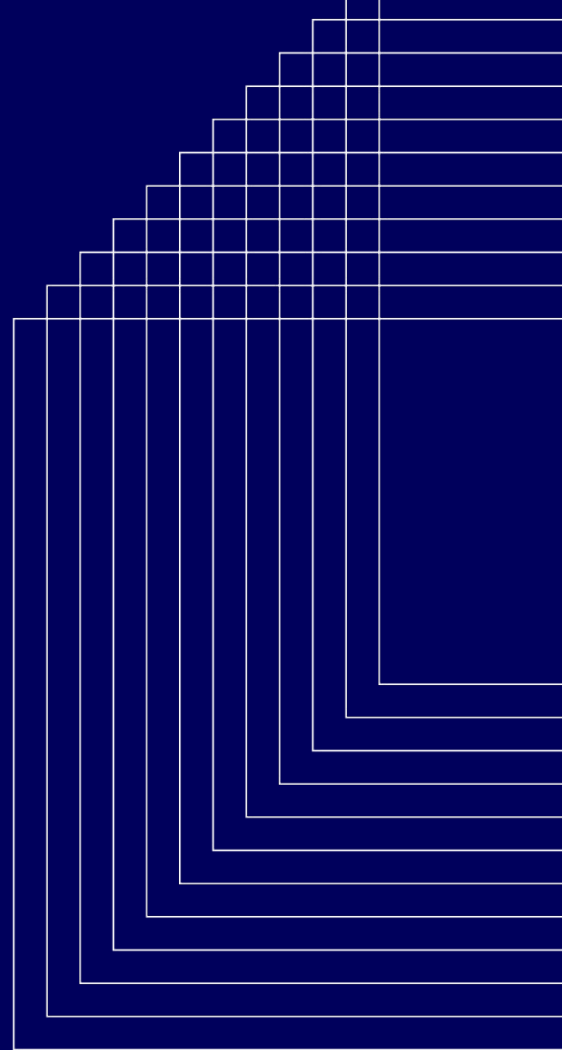
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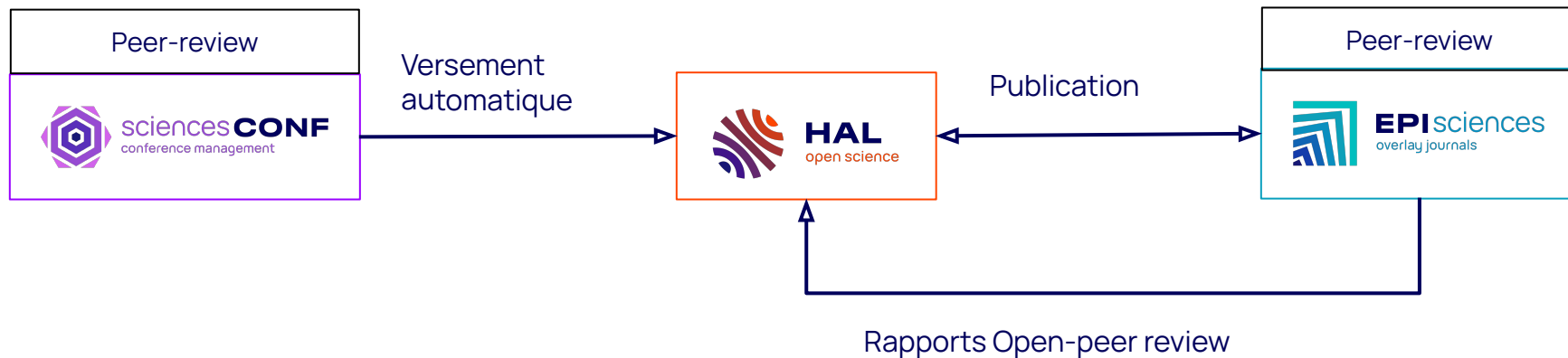
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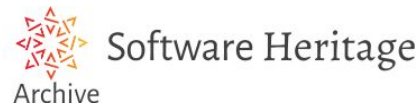
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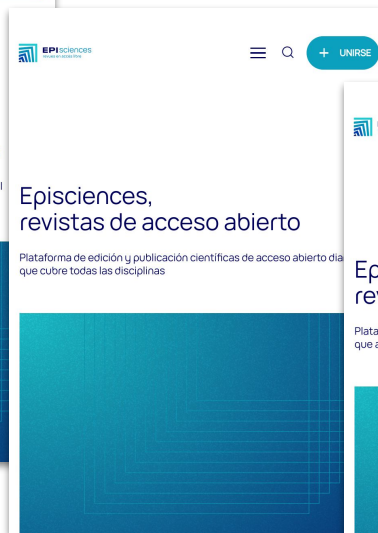
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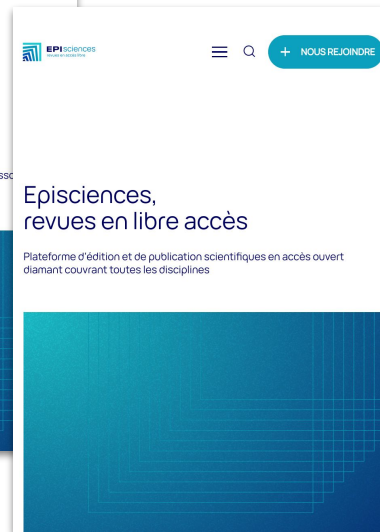
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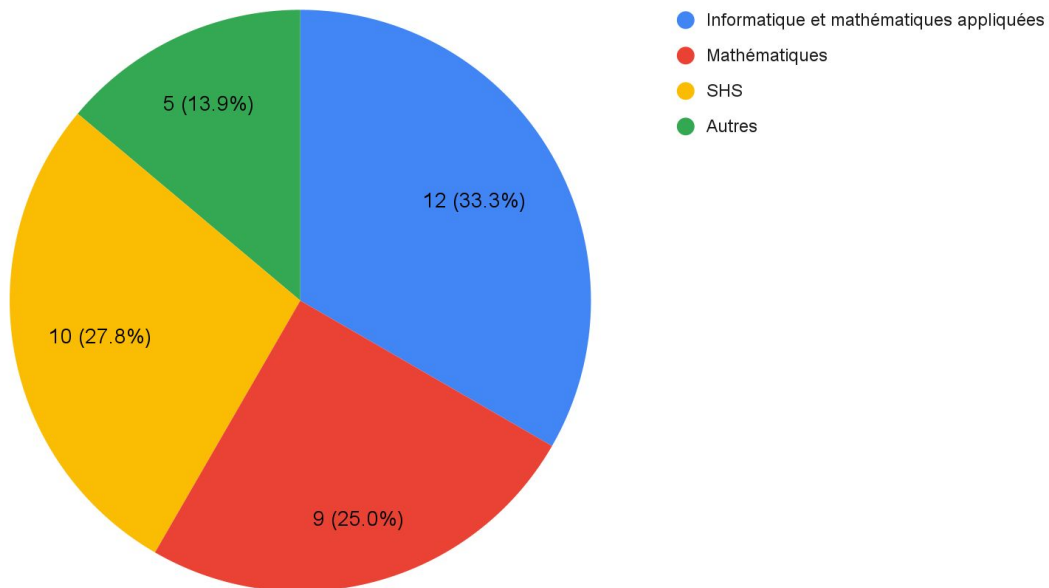
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