Modifiche da fare per ICFEM

-    **Alcuni related work**: in particolare, hybrid systems (tornano fuori sempre e cmq…), CEGAR (sinceramente secondo me e’ vagamente collegato a quello che facciamo noi a livello filosofico, ma va citato), real-time synchronous control-command software (mai sentito parlarne, a occhio mi sembra strettamente collegato agli hybrid systems, ma il reviewer li tratta distintamente)

* *~~The self-adaptive parameterization is really nothing but counterexample-guided abstraction refinement (CEGAR) in the model checking sense.~~*
* *~~The program that you are analyzing is simply a difference equation view of continuous evolution. There are many papers written about the verification of such models, including many that deal with grid-based methods. Can you compare these? Indeed, there may be some insights that could improve your analysis.~~*
  + *Ho preso vari papers di hybrid sistems ma non ne ho trovati con grid-based methods... sinceramente non perderei tempo a cercarne altri, direi che il related work ora é abbastanza variegato e completo e oltretutto credo che avremo grossi problemi di spazio.*
* *~~There exist much more compact alternate geometric representations, such as quad-trees (which have already been used to design abstract domains [d]).~~*
* *~~While the article focuses on the analysis of computer games, it is clear from the beginning that the article's definition of such software (p.1: an infinite reactive loop, complex state space with many real-valued variables, and strong dependencies among variables) exactly matches that of real-time synchronous control-command software as found in many industries (such as aerospace and automotive industries). There exist some previous works on the analysis of such systems.~~*
* *~~Moreover, there also exists a huge amount of previous work on the related topic of hybrid systems (note that the bounding ball example from Sec. 3 actually appears as an example of hybrid system in course notes [c]).~~ Although these works target real-valued functions, some ideas can surely be useful to analyze float programs, in particular partitioning techniques (for instance: [a]).*
  + *Questo commento non lo capisco! Ho guardato quella reference ([a]) ma non vedo come possa esserci utile... lo ignorerei.*
* *~~The idea of developing abstract domains tailored to an application domain is presented as new (p.2), but this has been done before. In fact, it has been applied to the related application domain of avionic software [b].~~*
* *Most importantly, there is no mention of analyses employing refinement techniques related to the paper, such as interval splitting. A recent example is given by [e]. Splitting techniques are also widely used in other fields, such a constraint programming or geometric algorithms.*
  + *Non riesco a capire cosa c’entri con il nostro lavoro... lo ignorerei.*

~~-    Descrivere come tracciamo da che ipercubo iniziale un ipercubo finale proviene (~~*~~The paper seems to assume that we can decide exactly which initial state leads to which follow-up states. That means that we are not only storing abstract states, but also all abstract transitions of the system. My main concern is that the authors do not mention at all how they try to keep track of all this information.~~*~~)~~

-    Ridurre da 20 a 15 pagine. *A large part of the article presents trivial information in much detail. Examples are: a 15-line paragraph on p.6 to explain the isomorphism between environments and points in a vector space; the function \gamma\_H on p.9; almost a full page to explain the abstraction of the initial state on p.11. Reporting the experiment on a simple bouncing ball example may not deserve four pages.*

-    Poi ci sono un po’ di piccoli remark che a occhio possiamo incorpare in un paio d’ore di lavoro in tutto

* *~~TYPOS: page 6: quite wider -> quite wide; page 7: plan -> plane; page 17: bring to verify (not proper english). - p.3, <bop> is missing the equality operator - p.5, "wait that the position of the ball is lower" -> "wait for the position of the ball to be lower" - p.6, "no more able to" -> "not able to ... anymore" - p.7, "the hypercubes are now six" -> "there are now six hypercubes" - the notation for intervals is not used consistently; it varies between [x,y] and [x..y] - p.15, trace partitioning is mentioned, but it seems that loop unrolling is actually used - p.17, "bring to verify the property" -> "ensure that the property is verified" - p.17, "the no derive" -> "the no derives"~~*
* *~~The English is not always grammatically correct and, partly because of this, it is not so easy to read in places. For example, I cannot parse the following sentence in the abstract: "Game software deeply relies on physics simulations, which are particularly demanding: due to the large amount of interleaving floating point variables, the numerical domains already studied in the literature either lack accuracy too much, or their use becomes unfeasible due to the exponential cost of abstract operations."~~*
* *~~There are places where what is said is not justified and not necessarily true -- see page 2, middle paragraph: "non-relational domains guarantee efficient analyses," I doubt that any domain can "guarantee efficiency" and if there is to be a comparison between the efficiencies of non-relational domains and polyhedra, then it should be backed with some kind of justification (a reference or a discussion of the complexity of the abstract operations).~~*
* *~~Section 2 gives a language syntax for the programs that is supported by the analysis. This covers simple arithmetic operations, logical comparisons and connectives, assignment, statement sequences and if and while statements. There is no comment about whether this syntax is adequate for games software or what are the problems in extending it so that it would be.~~*
* *~~The description of the concretization function in 4.2 should be improved.  In lines -5 and -4, page 8, overline 'Val' used as a subscript for gamma is then only described in a later paragraph; I cannot find what 'Val' is meant to signify and I cannot find where overline 'V' is explained.~~*
* *~~In section 5, there is a phrase that is repeated (with minor changes; the first time on page 10, lines -11/-10: "and fixed widths are a key feature in order to obtain an efficient analysis." and again on page 11, lines 8/9: "keeping the fixed widths of the intervals, which is a key feature of our domain in order to obtain an efficient analysis."~~*
* *~~Page 10, the last full sentence starting "This approach" does not parse.~~*
* *~~Page 19 "The computational cost raises when lifting": change 'raises' to 'rises' or (better) 'increases'.~~*

-    Il penultimo remark del reviewer 2 (praticamente alla fine della review) mi piace. Quello che suggerisce e’, invece di presentare un dominio e poi dire che abbiamo fatto degli improvements, metterli dentro al dominio come delle key feature. Il tutto su per giu’ porta a ribaltare la struttura del paper, ma sono d’accordo che potrebbe presentare il nostro lavoro con maggiore efficacia. L’unico problema e’ che queste modifiche potrebbero portare via parecchio tempo e forse non ce la facciamo

-    Maggiore valutazione sperimentale. A occhio, piu’ che altro ci basterebbe trovare altri esempi da analizzare, e mi sa che guardando un po’ gli hybrid systems (in particolare le notes citate da un reviewer) qualche altro buon esempio potremmo trovarlo senza troppi problemi

-    Usare una dimensione non omogenea per le celle degli ipercubi (reviewer 3). Sinceramente non penso sia una modifica che richiede tanto lavoro, e in effetti potrebbe dare un po’ piu’ di forza al nostro lavoro. “*it would make sense to use non-homogeneous cell size, where the width grows with the magnitude of the coordinate. This would be consistent with the use of floating-point numbers which have a fixed relative precision (one could, for instance, gather all the floats with the same exponent in the same cell).*”

*-    Un reviewer ci chiede che altri widening abbiamo considerato, ma mi sa che dobbiamo tralasciare il punto (visto che gia’ quello che abbiamo detto di utilizzare in realta’ c’e’ solo nella nostra testa :D)*

- Future work da ampliare? *For example, in concurrent systems, we often have cases where a shared memory structure is used and different worker threads work on different offset regions within this array. You could try to extend your notion here (of offsets) into this application area.*