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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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*Ex parte* NUTTAPONG CHENTANEZ and  
MATTHIAS MULLER-FISCHER

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Appeal 2017-007093  
Application No. 14/043,499<sup>1</sup>  
Technology Center 2100

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Before MARC S. HOFF, CATHERINE SHIANG, and  
JOHN P. PINKERTON, *Administrative Patent Judges*.

HOFF, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Appellants appeal under 35 U.S.C. § 134 from a Final Rejection of claims 1–22. We have jurisdiction under 35 U.S.C. § 6(b).

We affirm.

Appellants' invention is a computer-implemented method for modeling a distribution of mass associated with a simulated fluid. A velocity vector is generated for each node in a grid of nodes (at least a first, second, and third node) associated with a fluid simulation. The method includes tracing a velocity vector associated with the third node to an inter-node

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<sup>1</sup> The real party in interest is NVIDIA Corporation. App Br. 3.

position that resides between the first node and the second node. A first incoming density contribution derived from the first node is combined with a second incoming density contribution derived from the second node to generate a density value for the inter-node position. The method further comprises computing a first outgoing density contribution associated with the second node and a second outgoing density contribution associated with the second node, based on the density value of the inter-node position. *See* Spec. ¶ 5. Appellants state that in their invention, a fluid interface associated with the fluid simulation may appear more physically realistic than the prior art, because numerical errors caused by violations of the conservation of mass may be reduced. Spec. ¶ 7.

Claim 1 is exemplary of the claims on appeal:

1. A computer-implemented method for modeling a distribution of mass associated with a simulated fluid, the method comprising:
  - generating a velocity vector for each node in a grid of nodes associated with a fluid simulation, the grid comprising at least a first node, a second node, and a third node;
  - tracing a velocity vector associated with the third node to an inter-node position that resides between the first node and the second node;
  - combining a first incoming density contribution derived from the first node with a second incoming density contribution derived from the second node to generate a density value for the inter-node position;
  - computing a first outgoing density contribution associated with the second node and a second outgoing density contribution associated with the second node based on the density value of the inter-node position;
  - adjusting a first set of weight values associated with the first outgoing density contribution and the second outgoing density contribution such that a sum of each weight value included in the first set of weight values equals one;

adjusting a second set of weight values associated with the first incoming density contribution and the second incoming density contribution such that a sum of each weight value included in the second set of weight values equals one;  
updating the density value of the inter-node position based on the second set of weight values; and  
approximating a density value for the third node based on the density value of the inter-node position.

App. Br. 19 (Claims Appendix).

Claims 1–22 stand rejected under 35 U.S.C. § 101 as being directed to non-statutory subject matter.

Throughout this decision, we make reference to the Appeal Brief (“App. Br.,” filed December 5, 2015), the Reply Brief (“Reply Br.,” filed April 3, 2017), and the Examiner’s Answer (“Ans.,” mailed February 3, 2017) for their respective details.

#### ISSUE

Does Appellants’ claimed invention recite a judicial exception (a law of nature, natural phenomenon, or abstract idea) without reciting an inventive concept sufficient to ensure that the invention would amount to significantly more than said judicial exception?

#### PRINCIPLES OF LAW

The Supreme Court

set forth a framework for distinguishing patents that claim laws of nature, natural phenomena, and abstract ideas from those that claim patent-eligible applications of those concepts. First, [] determine whether the claims at issue are directed to one of those patent-ineligible concepts. [] If so, we then ask, “[w]hat else is there in the claims before us? [] To answer that question, [] consider the elements of each claim both individually and “as an ordered combination” to determine whether the additional

elements “transform the nature of the claim” into a patent-eligible application. [The Court] described step two of this analysis as a search for an “inventive concept”—i.e., an element or combination of elements that is “sufficient to ensure that the patent in practice amounts to significantly more than a patent upon the [ineligible concept] itself.”

*Alice Corp. Pty. Ltd. v CLS Bank Int’l*, 134 S. Ct. 2347, 2355 (2014) (citing *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 132 S. Ct. 1289 (2012)).

## ANALYSIS

In discussing the first prong of the *Alice* analysis, Appellants argue that the claimed invention does not recite a judicial exception, i.e., an abstract idea, because the focus of the claims is on an asserted improvement in computer capabilities. App. Br. 12; see *Enfish, LLC v. Microsoft Corp.*, 822 F.3d 1327 (Fed. Cir. 2016). Appellants contend that the claimed approach “generates a fluid interface associated with a fluid simulation that may appear more physically realistic, because numerical errors caused by violations of the conservation of mass may be reduced.” App. Br. 12. The invention in *Enfish* concerned a self-referential table for a computer database, which the court found to constitute a “specific improvement to the way computers operate.” *Enfish*, 822 F.3d at 1336.

We are not persuaded that Appellants’ invention is analogous to that in *Enfish*. The invention under appeal concerns what the *Enfish* court termed “a process that qualifies as an ‘abstract idea’ for which computers are invoked merely as a tool” - a mathematical simulation in which the mathematics have been modified relative to the prior art, such that the result

of the math corresponds to physical laws more accurately. *See id.* We find that the claimed invention does not recite a specific improvement in the way computers operate.

Appellants further argue that the invention falls outside the judicial-exception abstract idea because it recites a specific means or method that improves the relevant technology. App. Br. 13; *see McRO, Inc. v. Bandai Namco Games Am. Inc.*, 837 F.3d 1299 (Fed. Cir. 2016). Appellants assert that the claimed approach “improves computer-based fluid simulation by reducing numerical errors, leading to more physically realistic fluid interfaces.” App. Br. 13. In *McRO*, the claimed method included the final step of “applying said final step of output morph weight sets to a sequence of animated characters to produce lip synchronization and facial expression control of said animated characters.” The court found that the claimed improvement produced “accurate and realistic lip synchronization and facial expressions in animated characters’ that previously could only be produced by human animators.” *McRO*, 837 F.3d at 1309. The automation improved the prior art through “the use of rules, rather than artists, to set the morph weights and transitions between phonemes.” *Id.*

Appellants’ arguments with respect to *McRO* are not persuasive. In contrast to the invention in *McRO*, the claimed invention recites no such application of the computed density values or weight values. No physical conditions or results are affected or altered by the results of the mathematical computations performed in Appellants’ method. We agree with the Examiner that there is no disclosure of the manner in which the claimed algorithm improves any type of display of the simulated fluid. Ans. 4.

Turning to the second prong of the *Alice* analysis, Appellants argue that the claims recite significantly more than an abstract idea. The claimed approach, it is argued, includes adjusting a first set of weight values, and adjusting a second set of weight values, with a density value of an inter-node position being updated based on the second set of weight values. App. Br. 16. We are not persuaded that the claims recite “significantly more” under *Alice*. The claims appear to be directed entirely to the details of the mathematics involved in modeling a distribution of mass associated with a simulated fluid. We find that the claimed adjustment of weight values is merely a subpart of the overall abstract idea of simulating a fluid by performing mathematical calculations. There are no additional elements that transform the nature of the claim into a patent-eligible application. *See Alice*, 134 S. Ct. at 2355.

We find that the claims recite the abstract idea of modeling a distribution of mass associated with a simulated fluid, and do not recite significantly more that would transform the nature of the claim into a patent-eligible application. Accordingly, we sustain the Examiner’s § 101 rejection of claims 1–22.

#### CONCLUSION

Appellants’ claimed invention recites an abstract idea, and does not reciting an inventive concept sufficient to ensure that the invention would amount to significantly more than the claimed abstract idea.

#### ORDER

The Examiner’s decision to reject claims 1–22 is affirmed.

Appeal 2017-007093  
Application No. 14/043,499

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED