

THIS OPINION WAS NOT WRITTEN FOR PUBLICATION

The opinion in support of the decision being entered today
(1) was not written for publication in a law journal and
(2) is not binding precedent of the Board.

Paper No. 12

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte CRAIG A. WAGNER

Appeal No. 94-2299
Application 07/623,324¹

ON BRIEF

Before HAIRSTON, FLEMING, and TORCZON, Administrative Patent Judges.

HAIRSTON, Administrative Patent Judge.

¹ Application for patent filed December 5, 1990.

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DECISION ON APPEAL

This is an appeal from the final rejection of claims 3 through 5.

The disclosed invention relates to a method in a multiblock system for iteratively processing pseudocompressibility equations as a prediction of steady, incompressible fluid flow over a given geometry.

Claim 3 is the only independent claim on appeal, and it reads as follows:

3. In a multiblock system for iteratively processing the pseudocompressibility equations as a prediction of steady, incompressible fluid flow over a given geometry, a method of coupling solutions to the pseudocompressibility equations between blocks of the multiblock system comprising the steps of:

creating an overlapping multiblock grid model of the given geometry, each block being defined by boundary nodes and containing interior nodes wherein boundary nodes from one block overlap to interior nodes of an adjoining block;

updating, at each iteration, boundary nodes from the one block overlapping to interior nodes of the adjoining block, where updated boundary nodes for the one block are equal to a difference between corresponding boundary nodes for the one block and overlapped interior nodes of the adjoining block; and

processing, utilizing the pseudocompressibility equations, both boundary and interior nodes of each block according to a central finite differencing method wherein equation solutions

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at updated boundary nodes of the one block overlapping to interior nodes of the adjoining block use boundary and interior nodes of the adjoining block, whereby the equation solutions at updated boundary nodes are coupled between the one block and the adjoining block.

Claims 3 through 5 stand rejected under the first paragraph of 35 U.S.C. § 112 as being based on a nonenabling disclosure. According to the examiner (Answer, pages 8 and 9):

Applicant has not adequately disclosed how the nodes are picked for a given geometry, how the picked nodes are assembled, and how to determine the compressibility of the fluid.

The determination of the compressibility of the fluid appears to be where the disclosure is more lacking. Applicant has not even disclosed which equations are used, or the data processing system to solve the 4,000 equations with the appropriate software to manage the processing of such a complex system.

The prior art cited by the Examiner and Applicant is evidence of the level of skill in the art. See Thompson, Composite Grid Generation Code for General 3-D Regions--the Eagle Code, AIAA Journal, 1988. In the fluid flow art the knowledge of software engineering is rudimentary, at best. Therefore, given the state in the art in tandem with the shallowness of the disclosure [sic]. It would have take [sic, taken] countless man/hours to develop the invention as presently claimed.

Claims 3 through 5 stand rejected under 35 U.S.C. § 101 as being directed to nonstatutory subject matter. The claims

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were found to be nonstatutory because (Answer, paper number 11, page 2) :

The claims are not statutory even though the invention is a series of steps performed on a computer because the steps do not perform independent physical acts or manipulate data representing physical objects or activities to achieve a practical application. In fact, the claimed invention merely solve [sic, solves] a purely mathematical problem (i.e., segmenting an equation into manageable blocks so as to solve a mathematical problem) without any limitation to a practical application.

Reference is made to the brief and the answers for the respective positions of the appellant and the examiner.

OPINION

We have carefully considered the entire record before us, and we will reverse the rejections of claims 3 through 5 under the first paragraph of 35 U.S.C. § 112, and 35 U.S.C. § 101.

Appellant's response (Brief, pages 7 through 10) to the lack of enablement rejection is reproduced in toto:

As Appellant points out in his specification at page 6, lines 8-20 and page 9, lines 8-19, generation of a multiblock grid model is known in the art and does not comprise part of Appellant's invention. Appellant is using one such known grid generation tool to create the overlapping multiblock grid model that makes the coupling method of the present invention possible. Accordingly, Appellant is providing herewith a copy of the cited reference.

Previously, boundary nodes of one block merely abutted boundary nodes of an adjoining block thereby creating [sic] an artificial boundaries within the flow region. See Appellant's specification at page 6, line 20 to page 7, line 8. It is submitted that Appellant's method uses one of the known grid model generation tools to create an overlapping multiblock grid model as claimed. It is therefore submitted that the Appellant has adequately disclosed how the nodes are picked and assembled.

Determination of steady incompressible fluid flow by computer processing of the pseudocompressibility equations in an iterative fashion (in conjunction with the Navier Stokes equations) is also known in the art. See Appellant's specification at page 2, line 17 to page 3, line 2; page 3, lines 13-15; and page 4, line 1 to page 6, line 7. Accordingly, the Appellant did not provide in the disclosure the details of what data processing system or software may be used to solve the Chorin equations (equations (3) and (4) in Appellant's originally filed specification). Indeed, the iterative process introduced by Chorin dates back to 1967. It is submitted that the Appellant has enhanced these existing methods based on using an overlapping multiblock grid model whose nodes are updated as claimed.

Specifically, prior to the processing of the pseudocompressibility equations at each iteration, Appellant updates boundary nodes of one block that overlap to corresponding interior nodes of an adjoining block. An updated boundary node is generated by taking the difference between the boundary node for the one block and the overlapped interior node of the adjoining block. Support and understanding for this claim language may be found in Appellant's specification at page 13, lines 8-11, and page 8, line 23, to page 9, line 9 in conjunction with FIG. 3. For example, prior to

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processing pseudocompressibility equations for block 102 at node B (i.e., a boundary node for block 102), node B is updated by the difference between its value as a boundary node and its value as an interior node 101i in block 101. In this way, blocks 101 and 102 are coupled prior to equating the pseudocompressibility solution according to a central finite differencing method described in the Appellant's specification at page 11, line 22-26.

It is respectfully submitted that the Examiner's contention that "it would take countless man/hours to develop the invention" as presently claimed is unfounded. As pointed out above, the solving of pseudocompressibility equations in an iterative fashion has been known since 1967 (see page 2, line 17 to page 3, line 2). Since that time, grid models of flow regions have been developed as discrete mathematical pieces that introduce artificial boundaries in the flow region. It is submitted that the Appellant's claimed method overcomes this deficiency by coupling the adjoining blocks thereby removing the artificial boundaries to allow the solution to converge more quickly. Thus, known iterative processing techniques for solving the pseudocompressibility equations need only be updated with the Appellant's claimed method. Furthermore, Appellant is neither claiming nor is limited by a particular data processing system. Accordingly, any high speed processor capable of handling the volume of equations may be used.

We agree. The lack of enablement rejection is reversed because the examiner has not made a convincing showing that the "countless man/hours to develop the invention as presently claimed" would amount to undue experimentation.

As indicated supra, the disclosed and claimed invention

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is directed to more than just the mathematical algorithms required to perform the claimed method. Appellant has correctly argued (Brief, pages 6 and 7) that:

Indeed, as pointed out above, the application of the pseudocompressibility equations to a grid model to solve a fluid flow problem is known in the art. It is submitted that Appellant is only claiming the use of the pseudocompressibility equations in combination with the above described first two process steps. Thus, it is submitted that the claims do not seek to preempt a mathematical algorithm per se. Instead, the instant claims are analogous to those upheld in Diamond v. Diehr, wherein the Court stated that the applicants "do not seek to patent a mathematical formula . . . they seek only to foreclose from others the use of that equation in conjunction with all of the other steps in their claimed process". 209 USPQ 1, 8 (1981). Appellant's claimed method is similarly limited in that the mathematical algorithm recited is only applicable in conjunction with all of the other process steps.

We agree. "[A] claim drawn to subject matter otherwise statutory does not become nonstatutory simply because it uses a mathematical formula, computer program or digital computer." Diamond v. Diehr, 450 U.S. 175, 187, 209 USPQ 1, 8 (1981). In summary, the nonstatutory rejection is reversed because we disagree with the examiner's conclusion that the claimed method is "without any limitation to a practical

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application."²

² In State St. Bank & Trust Co. v. Signature Fin. Group, 149 F.3d 1368, 1373, 47 USPQ2d 1596, 1601 (Fed. Cir. 1998), the Court abandoned the so-called Freeman-Walter-Abele test in favor of a more common sense approach of determining whether the claimed subject matter "constitutes a practical application of a mathematical algorithm, formula, or calculation."

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DECISION

The decision of the examiner rejecting claims 3 through 5 under the first paragraph of 35 U.S.C. § 112 and 35 U.S.C. § 101 is reversed.

REVERSED

KENNETH W. HAIRSTON)	
Administrative Patent Judge)	
)	
)	
)	BOARD OF PATENT
MICHAEL R. FLEMING)	APPEALS AND
Administrative Patent Judge)	INTERFERENCES
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