

P versus NP

Birch and Swinnerton-Dyer Conjecture

Poincaré Conjecture

Hodge Conjecture

Riemann Hypothesis

Navier-Stokes Equation

Yang-Mills and Mass Gap

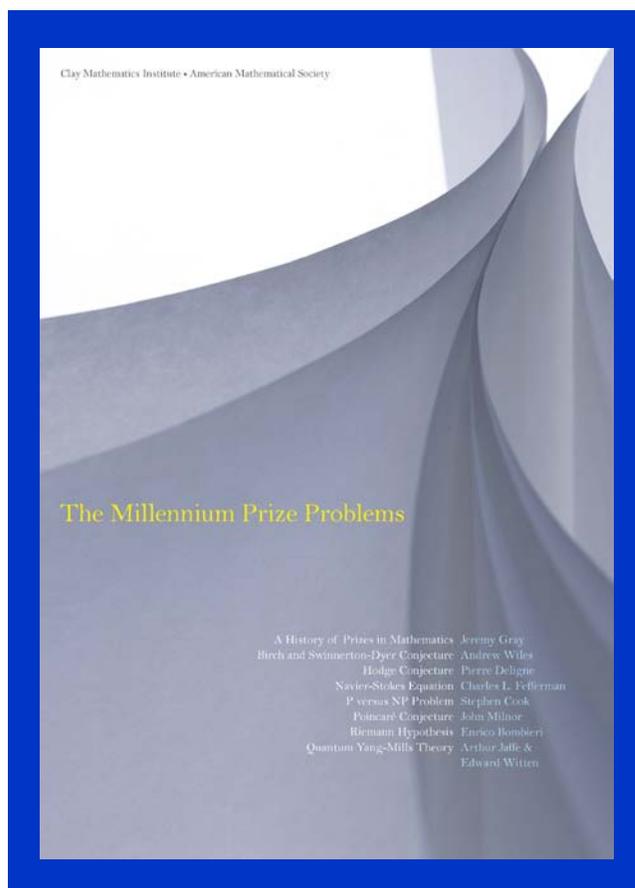
HISTORY

On August 9, 1900, at the second International Congress of Mathematicians in Paris, David Hilbert delivered his famous lecture in which he described 23 problems that were to play an influential role in the mathematical research of the coming century. One hundred years later, on May 24, 2000, at a meeting at the Collège de France, the Clay Mathematics Institute announced the creation of a \$7 million prize fund for the solution of seven important classic problems that have resisted solution. The prize fund is divided equally among the seven problems, and there is no time limit for their solution.

The Millennium Prize Problems were selected by the founding Scientific Advisory Board of CMI – Alain Connes, Arthur Jaffe, Andrew Wiles, and Edward Witten – after consulting with other leading mathematicians. Their aim was somewhat different than that of Hilbert: not to define new challenges, but to record some of the most difficult issues with which mathematicians were struggling at the turn of the second millennium; to recognize achievement in mathematics of historical dimension; to elevate in the consciousness of the general public the fact that in mathematics, the frontier is still open, and abounds in important unsolved problems; and to emphasize the importance of working toward a solution of the deepest, most difficult problems.

PUBLICATION

Later this year, CMI and the American Mathematical Society will jointly publish *The Millennium Prize Problems*, which gives the official descriptions of each problem as well as the rules for awarding the prizes. The book includes an essay on the history of prize problems in mathematics by Jeremy Gray.



Problems have long been regarded as the life of mathematics. A good problem focuses attention on something mathematicians would like to know but presently do not. This missing knowledge might be eminently practical, it might be wanted entirely for its own sake, its absence might signal a weakness of existing theory – there are many reasons for posing problems. A good problem is one that defies existing methods, for reasons that may or may not be clear, but whose solution promises a real advance in our knowledge.

–Jeremy Gray