

数学与系统科学研究院

计算数学所学术报告

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报告题目: Integer Solutions to System of  
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Reachability Determination in Petri Nets

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计算数学所报告厅

# Integer Solutions to System of Linear Equations and its Application to Reachability Determination in Petri Nets

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## Abstract

While finding integer solutions to linear Diophantine equations is proved to be polynomially solvable, identifying integer solutions to linear Diophantine equations on a bounded integer set is known to be NP-complete. In this talk, we report that finding integer solutions to linear Diophantine equations on a bounded integer set can be transformed into a hyperplane arrangement problem in computational geometry. Using the cell enumeration schemes from discrete geometry, finding integer solutions to linear Diophantine equations on a bounded integer set,

$$Ax = b$$

$$x \in \{x \in \mathbb{Z}^n \mid 0 \leq x_i \leq u_i, i = 1, \dots, n\},$$

where  $A \in \mathbb{R}^{m \times n}$  and  $b \in \mathbb{R}^m$ , can be achieved in  $O((nw)^{n-m})$ , where  $w = \max_{i=1, \dots, n} u_i$ . Our research is motivated by the reachability determination problem in Petri nets and an application of our new results to it demonstrates a preliminary success.