



# Using Multiple Graphics Accelerators to Solve the Two-dimensional Inverse Heat Conduction Problem v2.0

Sándor Szénási

*John von Neumann Faculty of Informatics, Óbuda University  
96/B Bécsi út, Budapest, H-1034, Hungary*

Imre Felde

*John von Neumann Faculty of Informatics, Óbuda University  
96/B Bécsi út, Budapest, H-1034, Hungary*

---

## Abstract

In this paper, we present a novel parallel algorithm implemented on graphics accelerators to solve the two-dimensional inverse heat conduction problem (estimation of the temporospatial heat transfer coefficients without any prior knowledge of the thermal boundary conditions) based on Particle Swarm optimization method. In the absence of analytical solutions, there are several heuristic methods to solve the problem, but the unacceptable high runtime (several days) makes these unsuitable for practical use. This paper presents the methods on how to adapt the original sequential algorithm to an efficient data-parallel one, keeping in mind the main features of graphics processing units (launching multiple threads on all multiprocessors, storing data in fast on-chip memory, eliminating warp divergence and memory transfer latency, using the host and device together, etc.). The achieved  $\sim 45\times$  speed-up (without any accuracy degradation) makes the heuristic methods suitable for practical use. Some of the proposed ideas are generally usable; therefore, this paper can be considered a step-by-step guide for researchers of other fields to speed-up general purpose calculations and evaluate the results.

*Keywords:* Inverse Heat Conduction Problem, Particle Swarm Optimization, Genetic Algorithm, Graphics Accelerators, Data Parallel Algorithm

---

متن کامل مقاله

دریافت فوری ←

**ISI**Articles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات