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## Development and Release of “WAON,” an Ultra Large-Scale Acoustic Analysis Program

Incomparable innovative acoustic analysis program for accurate analysis of large-scale issues in the high frequency region—Coming this fall

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CYBERNET SYSTEMS CO., LTD. (hereinafter “CYBERNET SYSTEMS”; First Section, Tokyo Stock Exchange (TSE); Head Office: Tokyo; Capital: ¥995 million; President: Shigehisa Inoue), has developed “WAON,” an ultra large-scale acoustic analysis program that allows personal computers to analyze acoustic issues of a large scale beyond conventional belief. We plan to start selling the program in the domestic market this fall. This product is our first large-scale software developed solely by CYBERNET SYSTEMS.

Among acoustic analysis methods using wave motion-related approaches for accuracy in analyzing the state of sound generation and sound transmission phenomena, the Boundary Element Method (BEM) is widely used because of its ease in handling external issues and modeling.

However, BEM, which is based on an asymmetric and full matrix, has disadvantages—computation takes much longer time than the Finite Element Method (FEM) and its available model scales, number of elements and analyzable maximum frequency are limited. Personal computers with a single 32-bit CPU and 2 GB of memory can compute a maximum of about 15,000 elements. In contrast, “WAON” allows the same capacity computers to compute a model of approximately 40,000 elements. Moreover, using a 64-bit machine with 8 GB of memory, “WAON” enables computation of approximately 220,000–260,000 elements with a single CPU.

For the “solver” part of “WAON,” the Fast Multipole BEM (FMBEM) is applied. FMBEM is a combination of the Fast Multipole Algorithm (FMA) applied to BEM, which does not require a matrix and therefore allows personal computers to handle ultra large-scale issues. FMA was introduced in the *SIAM News* (Vol. 33, No. 4), which is issued by the Society for Industrial and Applied Mathematics (SIAM), as one of the 10 most famous algorithms of the 20th century.

The FMBEM solver embedded in “WAON” was developed by a research group led by Professor Tetsuya Sakuma at the Graduate School of Frontier Sciences of the University of Tokyo. Professor Sakuma is a trailblazer in the application of FMBEM for acoustic analysis. The graphical user interface GUI was developed and commercialized by CYBERNET SYSTEMS, which has more than 10 years of experience in technical support for acoustic analysis software and contracted a lot of analyses. For such development and commercialization, CYBERNET SYSTEMS uses its own unique method, which prioritizes ease of use and high performance.

The range of applications for “WAON” extends from architectural acoustics such as concert halls, elevated railroads and soundproof walls to the issue of noise outside vehicles targeted at full-sized automobiles. Component products also enable sound field analyses for higher frequency ranges than before. In various fields, “WAON” allows personal computers to simulate large-scale issues that acoustic analysis engineers could not previously address using wave motion-related approaches.

Although prices and sales systems have yet to be decided, we intend to expand from domestic sales, which start this fall, to overseas marketing.

### About CYBERNET SYSTEMS

At CYBERNET SYSTEMS, we provide a wide range of cutting-edge technology software solutions in technological computation fields, especially related to CAE <sup>(Note)</sup>. We provide software, educational services, technical support and consulting services in various businesses and application fields such as electric, transportation and precision equipment, machinery, and educational and research institutes. We respond to diverse customer needs by promoting a wide range of world-class CAE software for structural, acoustic, mechanical,

control system, communications system, illumination and high-frequency circuit analyses, signal processing and optical design. For more details about CYBERNET SYSTEMS, please refer to our Web site at <http://www.cybernet.co.jp/>.

Note: CAE stands for Computer Aided Engineering, which refers to engineering numerical analyses and simulation using computers.

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## **Cybernet Systems Co., Ltd. Public Relations Contacts**

### **For Press Only**

Kazunori Katsumata

General Manager of Public Relations Department

Address : Nissay Otowa Bldg. 15-6, Otsuka 2-chome, Bunkyo-ku, Tokyo, 112-0012 Japan

Tel: 081-3-5978-5404

E-mail: [irquery@cybernet.co.jp](mailto:irquery@cybernet.co.jp)