

Proposal for High Pressure Research Database

A detailed comparison of new experimental data or new material models with previous work requires that the older data and model parameters be readily available. In the past, the research community relied on articles published in conference proceedings and applied journals. Today, almost every researcher has a powerful PC on his desk connected to the internet. Progress in high pressure research would be greatly enhanced if data and model parameters were readily available in electronic form. To meet this need we propose that the APS topical group on Shock Compression in Condensed Matter organize and maintain an electronic database for high pressure research that is accessible, via the internet, to the scientific community.

To organize a database, the first step is to decide on what it should include. It would be worthwhile for a high pressure research database to cover three broad areas: (i) experimental data, (ii) model parameters for specific materials and source code for evaluating quantities described by the various material models, and (iii) data from numerical experiments, such as molecular dynamics calculations or continuum mechanics simulations used to test and validate models. This represents the type of information needed to develop the quantitative understanding necessary for improving material models, which is the goal of high pressure research.

The second step is for the high pressure research community to agree on a format for the exchange of electronic information. As much as possible the format should be independent of computer architecture, operating system and commercial software. This suggests that simple ASCII files be used. A data file might include a header followed by lines with columns of number separated by tabs. The header file could include the author, date and description of variables in each column. For graphical data, standard formats such as jpeg or pdf could be used. This would allow a figure or plot to be viewed on standard web browsers.

The third step is to set up protocols for access to the database. The contents of the database should be available to all researchers. However to maintain scientific integrity, researchers should submit contribution to a moderator. One criterion for acceptance might be that the contribution provides detailed information supplementing an article published in a reputable scientific journal or reported in a conference proceeding. Another criterion might be that sufficient background information is provided for the moderator to judge that the contribution meets scientific standards and is of interest

to the research community. In any case, a condition of acceptance should be that the contribution is non-proprietary. To avoid disputes as to intellectual credit, a log should be maintained as to the author and submission date of each contribution placed on the database.

The final step would be to set up a web server. This requires finding a sponsor to fund the database. Since much of the high pressure research is performed at national labs or for the defense department, these organizations might provide the funding in order to foster progress in a field of direct interest to them.

A cooperative spirit within the research community is needed in order for the proposed database to be successful. To assess the interest, it may be worthwhile to schedule a session at the next SCCM topical conference to discuss issues related to and proposals for a high pressure research database.