1056-65-1802 **Joseph M Teran*** (jteran@math.ucla.edu), Mathematics Department, UCLA, Box 951555, Los Angeles, 90095-1555. *Virtual Surgery: Scientific Computing in Real Time.*

As a general rule, scientific computing for solid and fluid mechanics is regarded an offline task, often requiring days of CPU time to complete. However, it is now evident that future microprocessors will be highly parallel, incorporating a large number of cores with multi-threading and vector processing capabilities. This revolution in architecture will afford future chips the computational capacity found in today's massive clusters. Unfortunately, realization of this potential revolution in computing power is contingent upon the ability of numerical algorithms to successfully leverage the raw capacity of these parallel multiprocessors. This task is non-trivial given the nascent state of the architecture. Although the computing environment will resemble traditional high-performance computing, multi-core hardware will be sufficiently different to prevent simple porting of existing techniques from parallel computing. Novel approaches are needed that leverage the mathematical nuances of the various governing equations to meet the memory and scalability constraints of the hardware. I will discuss ongoing challenges developing such techniques and the potentially revolutionary applications they will admit. (Received September 22, 2009)