Consequences for scalability arising from multi-material modeling

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Key to success of large scale computing is efficient use of computational resources. Multi-material modeling by very definition implies a potential load imbalance with respect to computing on a parallel architecture. We will present results in two different areas where material discontinuities impact scalability and performance. In the first case we describe the impact that significant material discontinuities have on an H(curl) algebraic multigrid method. In the second case we discuss scalability tradeoffs between interface reconstruction techniques of varying quality ranging from SLIC to a new 2nd order reconstruction algorithm. We will discuss how these results vary for two important large scale architectures including ASC Purple and Red Storm.