Methods for resolving small scale systems problems

Technology, Information Technology

Methods for Resolving Small Scale Systems Problems Task: Methods for Resolving Small Scale Systems Problems Introduction A system can be either large scale or of small scale, but when partition or division occurs to large-scale systems; it divides them into various sub-systems, which make up small-scale systems. A system can also be large when it has large dimensions that lead to different techniques being involved in modeling and designing, failing to come up with an appropriate solution. Most of the large-scale methods for example, the multifunctional systems have many tasks that they perform, but before they perform these many functions they need different functions or activities. Best method to use in solving various problems facing the large-scale methods is by dividing those problems into small-scale subsystems. Methods for resolving small-scale system problems Most problems involved in engineering and scientific sectors get a solution through multiple scale solutions system. This method contains models with efforts to handle different problems whether large disparities are in time and space. The multi scale methods tries to get a multi scale solution by gathering embedded information which they later couple them using global information, for them to come up with accurate solution. When dealing with the small- scale problems, gathering of information are through using local multiscale function, which analyses the local sector information. While in large-scale, they lack scale separation in amassing the facts (Efendjey & Hou, 2009). Various methods that prove to solve a large-scale problem, have also been solving the small-scale problems. These approaches encompass generalized finite element method. This is a technique applied in finding precise solution to a given differential equation and integral ones. This method originated to tackle elasticity problems and those concerning structural analysis affecting the engineering together with scientific sectors. Today, this method is widely applied to various problems in structural, small together with large-scale systems, multiphysics together with fluids. In solving the large and small-scale method problems, the scientist uses this method to analyze all the main designs involved in general methods and the scientific sub branches studies. The use of commercial infinite element is included while dealing with computers, workstations and mainframes, which ends up solving complex problems. This method works best when dealing with small and large-scale methods because; it depends on the volume of input/output of the information. Therefore, it is possible for the designed computer program to divide the fed information to any needed portion (Skyttner, 2005). Secondly, there is the Wavelet-based numerical homogenization method. Through the invention of homogenization theory, it came to the realization that it is cheaper to devise numerical procedure, which will involve discretization of different equations (Skyttner, 2005). . This is a technique of great use in the approximation of differences among multiscales. It can be an effective method when handling both small and large-scale methods because it reduces the available scales making it easy to analyze the equation. Wavelet tackles different problems compared to other methods; it comes up with solutions to different equations with different scales. The main objective of this method is reducing the system's dimensionality by separating the large- scale methods into small -scale methods, and coming up with an appropriate solution for the equation (Skyttner, 2005). Thirdly, there is the Variational Multiscale method. This method is of use in both small scales together with large -scale system. According to this method, many systems require multiple scale methods to solve their problems because they accommodate and solve different problems within different scales. This method deals with problems affecting geophysical systems, living organisms and systems in condensed matter. When working with this method, one should be aware of the matters surrounding the small -scale methods that are available in large- scales system, and how large- scale practices affects small scale. The analysis of the system while working with this method is done through coming up with convenient solution using homogenization theory. Application of this method will put a large- scale method in the same grid with small-scale methods then carry out small-scale computation to enhance the flow and growth in large-scale control. Computation that occurs in small-scale during this process has no effect on large-scale (Blowey, Craig & Shardlow, 2003). Finally, there is the homogenization theory method which is a multiple scale method used within systems with spatial periodicity and statistical homogeneity. Here, the scale separation is among microstructure in small-scale together with input/output fed in large-scale. To work out on scale separation, this process points out the time scales and present physical length with periodic velocity. During this process, a division of scales that one should study will be needed. Homogenization theory method is the best when one is in need of finding out the source point of the problem because; it will spread to a wide length according to scale in use. For one to use this method, he should identify the problem first to understand the method that is in use. That is, if it is small or large-scale system then rescale the issue of space and time of interest. (Blowey, Craig, & Shardlow, 2003). Conclusion Since the introduction of multiscale methods, this field has advanced in their research and applications. Various methods are turning out to work best in resolving multiscale problems in scientific and engineering fields. Therefore, more research should happen on the same to know the main challenges that this field encounters and improves the developments in the existing multiscale methods. References Blowey, J., Craig, W., & Shardlow, T. (2003). Frontiers in numerical analysis. New York, NY: Springer. Efendjey, Y., & Hou, T. (2009). Multiple finite element methods: theory and applications. New York, NY: Springer. Skyttner, L. (2005). General systems theory: problems perspective and practice. (2nd ed). Hackensack: World Scientific Publishing Company.