ABSTRACT
Model transformation tools assist system designers by reducing the labor-intensive task of creating and updating models of various aspects of systems, ensuring that modeling assumptions remain consistent across every model of a system, and identifying constraints on system design imposed by these modeling assumptions. We have proposed a model transformation approach based on abstract interpretation, a static program analysis technique. In this paper, we present the foundations of our proposed approach to model transformation. We define model transformation in terms of abstract interpretation and prove the soundness of our approach. This work provides a methodology for relating models of different aspects of a system and for applying modeling techniques from one system domain, such as smart power grids, to other domains, such as water distribution networks.