

## **On the choice of coarse variables for dynamics**

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Two ideas for the choice of an adequate set of coarse variables allowing approximate autonomous dynamics for practical applications are presented. The coarse variables are meant to represent time-averaged behavior of a fine-scale autonomous dynamics. The problem considered starts from a fine dynamics with some idea of what time-averaged coarse variables one might be interested in and proceeds to augment this problem in a well-defined manner. We are particularly interested in problems where the ‘as-received’ fine scale problem may not readily have an obvious slow macroscopic dynamics associated with it. The proposed procedure modifies the problem definition so that an appropriate macroscopic dynamics becomes associated with the augmented microscopic problem. The augmented problem may be interpreted as having a singular perturbation structure. The procedure then utilizes ideas from the delay reconstruction technique, with an important difference in interpretation of some of its results, to select a set of coarse variables whose response may be calculated at less cost than the original fine system.