HRVATSKO DRUŠTVO ZA MEHANIKU

ZAGREB – OSIJEK – RIJEKA – SL. BROD – SPLIT

Predavanje u HDMu:

Parameter Identification for Continuum Mechanics Models

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SAŽETAK

Parameter identification in computational models is usually an ill-posed inverse problem, as it involves the observation of a function of the state of some system which depends on some unknown parameters. The mapping from parameter to observable is commonly not invertible, which causes the ill-posedness. In a probabilistic setting the knowledge prior to the observation is encoded in a probability destribution which is updated according to Bayes´s rule through the observation, equivalent to a conditional (conditioned on the observation) expectation. To perform the update one has to solve the forward problem, propagating the parameter distribution to the forecast observable. The difference with the real observation leads to the update. We do not change the underlying measure as is commonly dond, but instead we update directly the random variables describing the parameters, thus changing the parameter distribution only implicitly. This is achieved by a functional approximation of the random variables involved. The solution of the forward problem can be addressed more efficiently through the use of tensor approximations. We show that the same is true for the inverse problem. Both the computation of the update map – a “filter” – and the update itself can be sped up considerably through the use of tensor approximation methods. The computations will be demonstrated on some examples from continuum mechanics, for linear as well as highly non-linear systems like elasto-plasticity.