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Probabilistic cost-response functions for evaluating damage cost of buildings

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This paper attempts to make a contribution of probabilistic loss estimations in decision making phase of performance evaluation through proposing some practical functions relating directly probabilistic damage cost of building to structural responses (EDP-DV functions). These simplified and very practical functions modify the approach of loss calculation from component-based to story-based approach achieved for low-rise buildings with special steel moment frame resisting system and office occupancy. The quantities could be adjusted due to loss occurrence probability and the amount of structural fundamental period. The offered functions could intensely facilitate computation of seismic-induced economic loss straightforwardly without entering to the time-consuming procedure of probabilistic component-based performance assessment. The proposed functions have been verified by two benchmark studies illustrating very satisfying compatibility between the actual losses induced by earthquakes or the amounts evaluated by application of common component-based approach and the amounts evaluated by the recommended story-based functions in this study. It could be concluded from the benchmark studies that application of the proposed functions could simply encounter quantitative performance loss evaluation in decision making phase acquiring very glowing satisfactory accuracy level.

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