

## **Bayesian Inference For Seismic Damage Identification In A Reinforced Concrete Structure**

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This article presents the application of a Bayesian updating method to assess seismic damage in columns and in beam-column connections of a reinforced concrete frame structure. The structure is represented through a fishbone model that is updated using a Bayesian approach based on a maximum a posterior (MAP). The fishbone model has the advantage of considering the translation and rotation mode shapes, which is not straightforward in shear building models. The fusion of translation and joint rotation measurement, retrieved from small amplitude loading test and ambient excitations, is performed to update the model. Before its implementation using measured data, the Bayesian updating method is tested on a numerical model artificially simulating damage as a reduction of the elastic modulus of the material. Seismic damage is quantified through a comparison of the translational and rotational stiffness of the fishbone model, before and after the earthquake. Sensitivity analyses are carried out on both the measurement error and model error. Finally, the proposed method is applied using measurements collected to a scaled reinforced concrete moment resisting frame during shaking table tests.