

## **Estimation Method of Falling of Concrete Piece from Tunnel Lining**

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This paper describes a method which quantitatively evaluates the falling of concrete pieces from tunnel linings, comparing the shear stress acting on crack surfaces with the shear capacity. The shear capacity of cracks of the various width, inclination angle, and roughness are investigated based on a double shear test simulating the falling of concrete pieces and on a simulation method, whose applicability is also described in this paper. Core samples comprising the crack surfaces are obtained at actual tunnels and crack surfaces roughness and its distribution are grasped. The resisting capacity against the falling of concrete pieces is estimated based on the proposed method under the situation assumed at the actual tunnels.