

N.^o 06

Koyna Dam, 1967: why a concrete dam cracks at the "neck"

In 1967 an earthquake cracked Koyna Dam, in India, right where its downstream face changes slope. I modeled it in OpenSees and the video shows how that damage appears, second by second.

1.

Koyna, 1967

A gravity dam about 100 m tall in India. A nearby earthquake cracked it at two thirds of its height.

2. Why there

Where the downstream face changes slope, the section narrows suddenly. The top whips back and forth and the concrete, weak in tension, opens up.

3.

The model

$$T \approx 0.33 \text{ s}$$

OpenSees, concrete with tensile damage. The period matches Abaqus and the Chopra solution.

4. What the video shows

Damage does not grow smoothly: it appears in steps, right at the crest displacement peaks.

Full note, with equations and tables, at the link on my profile.

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