Rounded conforming Contacts in Partial Slip

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Abstract

One of the most commonly found static contacts is that formed between a flat faced component with rounded corners and a flat counterface -for example in gas turbine root fanblades and in the locking segments used to fasten risers onto sea-floor 'Christmas Tree' assemblies. Most analyses use a solution based on half-plane theory but this inaccurately represents the domain shape of both of these applications, because the free surfaces are too nearby for the half-plane representation to be applicable.
In this paper we show a combination of three solutions – first, an overall view of the contact pair, (fused together but without the radius present, and whose function is to include the free surfaces), secondly a wedge-based solution which fits into the contact corner, incorporating a crack to calibrate the third element of the solution. This is. a semi-infinite flat-faced but rounded-edge contact solution, derived from half-plane theory, because in this neighbourhood – at the contact edge - half-plane theory applies.

The three phases of the solution are linked by rigorous calibrations, and mean that we are able, also, to take into account a wide range of loads sequences relatively easily, and also to incorporate much more complex domain shapes than is possible using a standard based wholly on half-plane theory.

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