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Existence and Uniquness of Steady State Solutions in Thermoelastic Contact With Frictional Heating

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It is well known that contact and friction problems in thermoelasticity may lack solutions or have multiple solutions. Previously, issues related to thermal contact and to frictional heating have been discussed separately. Here they are coupled. Theorems of existence and uniqueness in two or three space dimensions are obtained, essentially extending, to frictional heating, results due to Duvaut, which were built on Barber's heat exchange conditions. Two different existence results are given. The first one requires that the contact thermal resistance goes to zero at least as fast as the inverse of the contact pressure. The second theorem has no such growth condition, but requires instead that the frictional heating, i.e., the sliding velocity times the friction coeffcient, is small enough. Finally, uniqueness is shown, if the inverse of the contact thermal resistance is Lipschitz continuous, and if the Lipschitz constant and the frictional heating are small enough.

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