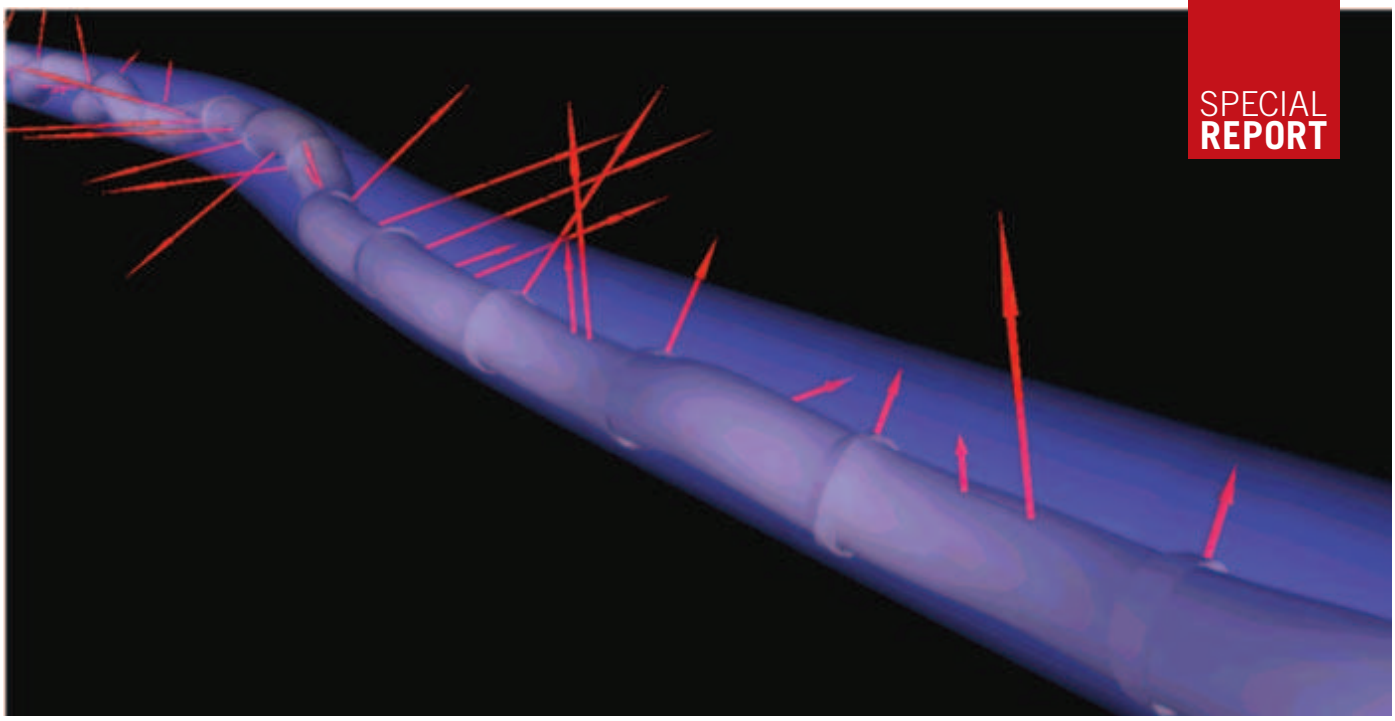
SPECIAL REPORT



The arrows indicate the contact locations of a buckled drillstring with a horizontal wellbore (Fig. 1).

Tests validate new drill pipe buckling model

S. Menand
Mines Paristech
Paris

A. Bjorset
Statoil
Trondheim, Norway

L. Macresy
Drillscan
Montreuil, France

A new drill pipe buckling model provided excellent predictions for each full-scale buckling test performed, not only in terms of deformed buckling shape but also in terms of weight transfer. Existing models, on the other hand, failed to predict observed drill pipe buckling behavior.

This is the first time in the drilling industry that a buckling model was successfully validated in the field, and this model can predict realistically the onset and severity of buckling for any 3D trajectory.

Many articles discuss buckling inside a wellbore, but an increasing number of field observations suggest that existing buckling theories fail to predict buckling phenomenon such as lockup. Indeed, existing buckling theories generally assume that the wellbore is ideal, lacking doglegs.

Recent advancements in drillstring mechanics modeling have demonstrated that doglegs, friction, and rotation affect greatly buckling.

This article compares results of full-scale buckling tests with a new buckling model that takes into account actual wellbore tortuosity.

Buckling

Buckling occurs when the compressive load in a tubular exceeds a critical value, beyond which the tubular is no longer stable and deforms into a sinusoidal or helical shape. The

DRILLSTRING CHARACTERISTICS Table 1

Element	Drillstring 1	Drillstring 2
Bit, m	1	1
5-in. drill pipe, m	0	480
Measurement sub, m	10	10
5-in. drill pipe, m	600	630
6½ and 8-in. drill collars, m	250	330
5-in. drill pipe, m	1,150	560